Industrial Medicine

Trade Mark

Volume 1 OCTOBER, 1932 Number 1

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"A venture new, I sing:
You captains, voyagers, explorers, yours!
You engineers! you architects, machinists, yours!
You, not for trade or transportation only,
But in God's name, and for thy sake, O soul."
—WALT WHITMAN.

Industrial Medicine

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"To The States, or any one of them, or any city of The States,
Resist much, obey little;
Once unquestioning obedience, once fully enslaved,
No nation, state, city, of this earth, ever afterward resumes its liberty."
—WALT WHITMAN.

The Law, the Science and the Economics of Industrial Health

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Periodic Medical Examinations

—The Truth About Them After 20 Years' Observation—

by

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THIS article is actuated by the desire on our part to bring to attention the opinions we hold regarding periodic medical examinations after a period of observation of 20 years actual experience with the same group of employees.

Twenty years ago, after careful investigation throughout industry, we were unable to find anything regarding a systematic procedure in periodic examinations. Their principal use was in the United States Army and Navy, and even here there was no regular annual examination of the same men, over any extended period of time, available for study. Pre-employment examinations of prospective employees were discovered on some railroads and public utility companies, but they were neither extensive nor far-reaching in their results.

At this early date the necessity of an apparently healthy person submitting himself for a medical examination was not given any great importance, either by the layman or his medical adviser. This is not mere hearsay; from letters and conversations with my brother physicians at that time the fact was impressed upon me that the proposed periodical medical surveys of our employees, which we were about to inaugurate on the Elevated Lines in Chicago, were considered by them, the physicians, as usurping the personal liberty of the layman and the prerogatives of the private physician. In fact, we were strongly advised by our friends that such a procedure would not be successful and that we would be severely criticised both by labor and the medical profession.

WHAT prompted the inauguration of this work and what were the needs of this policy of conservation of employee health? The thought uppermost in our minds was to secure employees to operate our high-speed trains on the elevated structure with the greatest factor of safety for our daily customers who rode those trains. By the pre-employment examination in our company, which was made under a very strict entrance requirement, we were assured of safe employees at the time of their entrance into the company's employ. The periodic medical examination was to see that this initial asset of good health did not become a liability to safe train operation after the employee came into our service. Our industry being rapid transporta-

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tion, it was vitally important that only those men who were mentally and physically fit should have the responsibility of safely transporting the traveling public daily to and from their places of employment at all hours and under all weather conditions.

Another motive beside that of the safety factor was the desire on the part of our management to assist the employees in maintaining physical health without the accompanying burden of medical expense. If we were able to detect incipient disease conditions in time to institute corrective measures we would be able to have the employees as members of our large family for a longer period of time. Good health is an asset in any walk of life, and we believed that by a regular periodical examination of all employees—from the water boy to the president—with the economic value of this work frankly explained to them and their representatives in organized labor, the employees would be quick to sense its value to themselves and the members of their families. There could be no discrimination as to who would be examined, and assurance was necessary that no employee would suffer the loss of his or her position on account of physical defects found. The knowledge was necessary that where a physical defect was a hazard to the safe performance of work, a position would be forthcoming where the employee could function with safety to himself and those entrusted to his care. Most important to our minds was that the findings of these examinations would be held confidential and that there would be no ulterior motive back of our medical policy.

All this was carefully explained by our president, Britton I. Budd, to our family of employees, both by letter and at three large meetings which the greater number of employees attended. The assurance given the employees 20 years ago has yet to be violated; and I can frankly state that only by such an open and aboveboard manner can any health policy be successful in any industry.

With the employees in a receptive mood for the inauguration of this medical protection, it was seen fit not to make it compulsory in any manner. The employee was free to accept or reject the medical aid and his rejection would not affect his standing in the company. From the initial medical survey down to the present date there have been only 13 employees who refused this service, and all of these within a few days after refusal reconsidered their stand and—when certain little misunderstandings were explained to them—submitted themselves for the examination. This attitude was necessary on account of this being something new and revolutionary, and more so on account of the veil of mystery that surrounded medical practice in those days.

If these periodical examinations were to be of any value to our employees it was important that we prevent the ingress of defective people into our service at the time of employment so that only safe and healthy people were employed. One of these conditions of employment was a standard of special sense and physical requirements. These standards were set as high as possible in order to obtain only the highest physical grade of employee. We may be accused of being selfish and devoid of feeling at being so strict and discriminating in the selection of our employees, but where the safety of the traveling public is concerned, the best is none too good. The standards set 20 years ago are still unchanged. We were emphatically assured by our brethren in the medical work of the railroad industry that such high standards of physical fitness would not be practical and that we would not be able to secure sufficient employees to fill our vacant positions. We nevertheless decided to give it a fair trial. The result speaks for itself. Our standards have not been revised for the past 20 years, and we have always had a waiting list of prospective applicants far in excess of our needs.

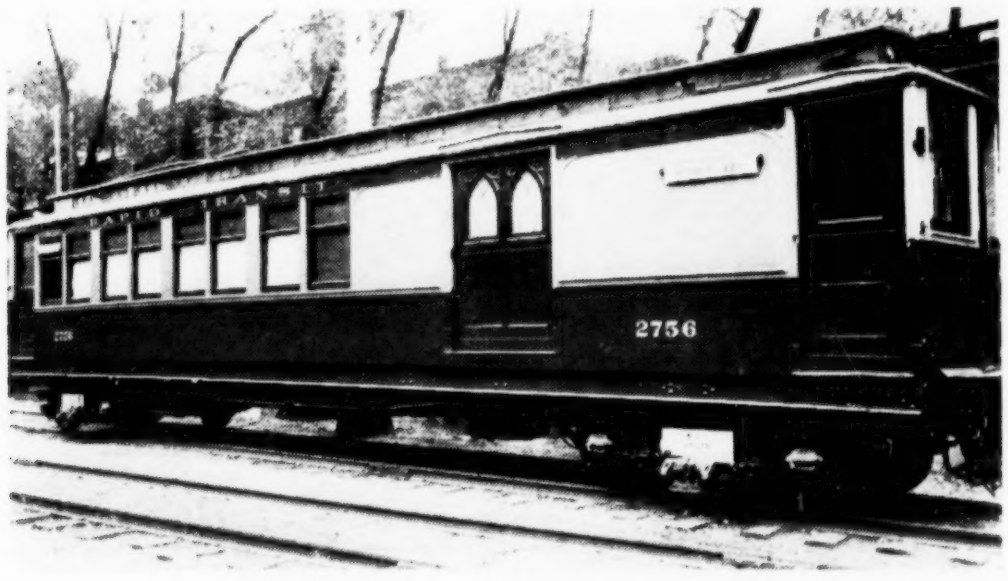
The thought may arise that it is no wonder we have good results from our subsequent periodical examinations if we take only those physically perfect into our employ. The answer is that, with a known quality of physical fitness at the time of employment, we are better able to study, through our medical re-examinations, those defects and diseases that arise in the course of daily life after employment, thus sensing their value. Regardless of the state of perfection of health of any given individual at the time of employment, there will develop, if given time, certain defects, which, if neglected or not discovered, will be the cause of accident, or make the cure very doubtful.

WHAT interval was thought necessary for these periodical examinations? At the inauguration of the work there was no set interval decided upon. That can only be determined by actual experience and the state of physical health found after one or more annual surveys of the employee group. Prevention of disease or physical defects cannot be accomplished in periods of time, but a constant effort is essential if real value is to be had from this work. Some employees require closer supervision of their health than others on account of the differences in physical make-up and resistance.

We started the first periodical survey with employees on one division, regardless of age, length of service, or job classification. When one division was completed, we moved to the next in rotation until we had covered the entire property—which consumed one year from the day we started.

The employees were given every consideration as to

the conservation of their time and convenience. To carry the examination to them in dignity and in an environment of comfort and surroundings that would be conducive to cooperation and respect for the service, a hospital car was secured which consisted of two sections, one for the waiting room and one for the examining room. This car was equipped with all the necessary examining and diagnostic apparatus and was placed at convenient locations at various shops, terminals, and yards where the examinations were to be conducted. The employees were sent in on schedule time, one every 30 minutes. They were assured of privacy, and this was conducive to their cooperation. The failure of this work in some industries may be laid to the fact that makeshift quarters are usually provided for the medical examinations and carry no dignity with the work. Hence the employees are not impressed with the environment. How can one expect them to be enthused when so little effort is made to provide suitable quarters insuring privacy?



Exterior of the Medical Car

WHAT is the personnel of this hospital car or examining car? In the early days the Medical Department had only one full-time doctor on duty in the car. Today a regular trained nurse and office clerk are included with the doctor. The medical car and personnel are kept busy the year around. As soon as they have completed the entire roll of employees they start over. This has been the practice up to date; the examination has been conducted annually except in the year 1918, during the war.

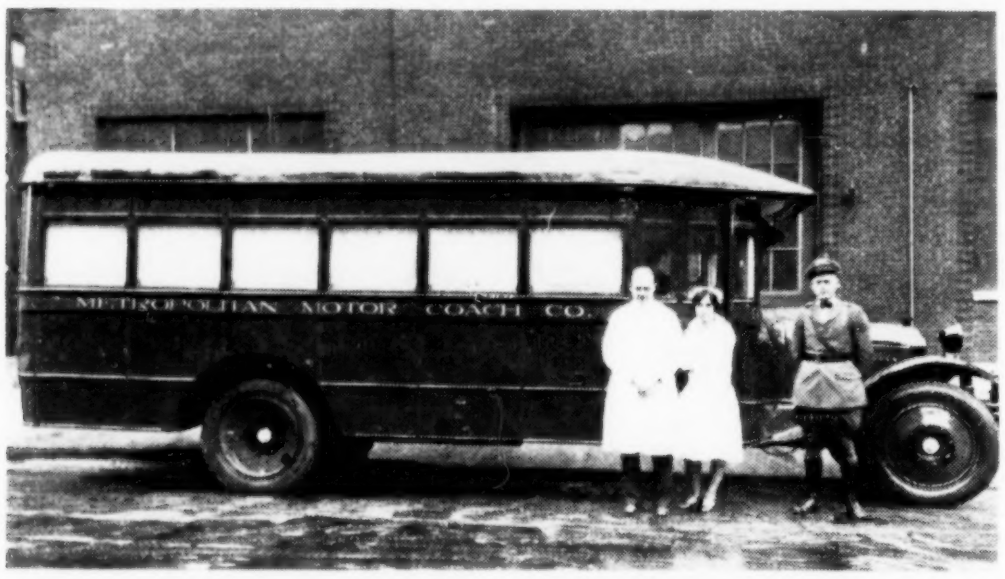
Before we take up the routines of the periodical examination, allow me to dispose of the fallacies so often heard emanating from the critics of this work of periodical examination, especially in industry. It is said that many people put off going to the physician for a check-up of their physical condition because they are fearful of being told that they have something wrong with them, and that if such were the case, they would rather not hear about it. In our 20 years of experience we have yet to hear this statement from a patient as a reason for deferring his examination. The true reason why people defer their examination is because the great majority have an optimistic view of their life. They put off until tomorrow what they can do today, thinking that it will be time enough to have the physical check-up at some future date. If they do not feel any unusual conditions present in their bodies then they have no impulse to make the attempt to see if there is anything wrong with them. Few people are fearful of the truth, rightfully expounded; but, in the experience of many, controversial advice has been given to patients by their medical advisors after a superficial examination which was later found groundless by another physician more painstaking than the first. The average person, when properly informed as to the value that accrues to him by being physically fit in his daily work, will take the necessary steps to keep himself fit. When one realizes that his position and income is measured by his health ratio he will place greater value on his body health.

Another fallacy I wish to dispel is that of the fear of loss of work or position if one is found physically defective. In the tens of thousands of periodical examinations conducted under our supervision in the past 20 years in many transportation and utility companies, only a very small percentage of the employees was found so physically unfit as to necessitate their removal from the company. The largest number were found

Interior of the Medical Car

free from defects of any serious nature. In the various groups examined the general average has been that 80% of all defects found were correctible to normal. Of the remaining 20%, 15% were able to be improved so that there was no immediate danger to the person or his work and so that he remained an economic factor in the company. Of those found defective 5% necessitated only a short absence from their work for treatment to assure their safety in train operation. Less than 1% were removed temporarily from work while treatment was being instituted. When these were found fit for some kind of work they were placed where their physical handicap would not be a hazard to them.

One of the main reasons why people are averse to periodical medical examinations is the so-called feature of compulsion as practiced in some industries, where the employee is arbitrarily removed from his gainful occupation by a ruling of the medical authority. The true value in industry of any medical man who has both the employee's and management's welfare at heart, is his value in maintaining an employee at his post of duty as an economic factor both to the man and his employer for the greatest length of time—not in finding defects and eliminating the employee from his work, with subsequent hardship on the man and



Exterior of the Medical Motor Coach

his family not to speak of the loss to the company of that particular employee's services which, many times, will be hard to replace.

The average person feels, unless it is explained to him, that his personal health is a matter that concerns no one but himself, and that any attempt by his employer to dictate what he should do as regards his health is over-stepping his personal liberties. There will be no such thoughts by the employees if the management has taken them into its confidence and explained in detail what is hoped to be secured, both for the worker and the management, in a sane program of health conservation.

Assurance of the strictest privacy of the physical findings of employees is essential to securing their confidence in this periodical medical examination. Each employee should receive the same privacy as that extended to the private patient. The need for keeping the results of an examination confidential is more essential in industry because there is a greater possibility of information escaping, owing to the large number of employees. The manner in which this confidence and privacy are conducted goes a long way toward determining the response of the employees to this work. They will remain away from periodical examinations for these two reasons more than all the others combined.

The conduct of the physician making the examination goes a long way toward determining whether the employees see the importance of the procedure. Should the doctor be lax in his methods, hurried in his conduct, and vague in his descriptions of his findings, it will react on the employees and determine whether their interest is aroused and their cooperation forthcoming.

The question often put forth by the individual to whom an examination is being explained is, "Why is it that we so often hear of a person suddenly dying who was recently examined by a doctor and pronounced in good health?" The public has not been given the opportunity of being informed of the reasons for such occurrences, and when any such happens they figure the examining doctor did not know his business. They lose confidence in us as a whole, and think that the value of early detection of disease is not what we say it is.

Many people are hesitant at having an examination on account of the expense often surrounding the procedure. There is no definite price set for this work, nor is there any definite limit set as to what constitutes a thorough physical examination that will give the necessary sense of security as to physical fitness. With our experience of the past 20 years in the transportation industry we can safely say that a carefully made examination, and especially of the special senses, supplemented by a urinalysis and blood pressure readings, will give a fair idea of the employee's state of health.

Interior of the Medical Motor Coach

This procedure carefully executed will usually furnish sufficient evidence on which to base a further and more detailed examination. A superficial examination gives a false sense of security and is usually valueless. The cost of such an examination cannot be rated in dollars and cents. A moderate fee should be the rule rather than a rarity.

WHAT constitutes a routine examination? The accompanying form will convey some idea of the thoroughness of this work. Besides the examination of the eyes for near and far visions and evidence of disease, it is necessary that color perception be tested on account of the operation of trains by color signals,

red and green. Four color tests are given each employee: the Holmgren Worsted Test, Williams Test Lantern, Thompson's Stick Test, and the Ishara Test. If any doubt is harbored as to the color perception of an individual, we use the Jennings Test. The range of hearing is tested in the usual manner for close and far range. This is now supplemented with an audiometer reading. The heart and lungs are carefully tested before and after exercise. Blood pressure readings are taken of all employees. Nose, mouth, teeth and throat are examined. The glandular system is palpated. Genito-urinary examination and rectal inspection are made on all cases. (This alone has been the direct means of many early detections of cancer of the rectum and bladder.) Mobility of spine and extremities and the presence or absence of hernia are determined. Temperature and pulse readings are made. Abdominal organs are palpated and percussed as to abnormality, and a urinary analysis is made of every employee. Complete blood examination and Wassermann tests are made in some of our affiliated companies on all employees. All laboratory specimens are sent in daily to our Central Medical Department laboratory where these tests are conducted by a competent technician.

WHAT are the procedures of the examination? After the examining doctor in the hospital car has completed his examination of the employee, he explains any slight defect found and advises the employee of the measures to correct the condition. If he finds evidence of unusual conditions or disease he terminates the examination and refers the employee to the Central Medical Department for additional examination and laboratory work, such as x-ray, metabolism, blood examinations, analysis of body fluids, etc. All employee defects are recorded, and then the proper forms are forwarded each day to the reviewing surgeon who, in turn, determines the disposition of the case. He makes out an observation card, and the employee is asked to come to the Medical Department where he is again thoroughly examined by another physician. The two examining surgeons' findings are compared. The necessary remedial service is rendered if the employee has no private physician, and if he has he is sent to the family doctor with information as to what was found in his periodical examination. If, during the course of treatment under his own physician, he should need special laboratory service this may be had on request by his physician from the Medical Department.

The employee not having these laboratory fees to pay, the private physician has a better opportunity of charging a proper fee. The cooperation forthcoming from the medical profession during the past 20 years has been very gratifying and we appreciate it.

Should the defects be of such a nature that the employees are a hazard in their regular duty, they are relieved and placed in a less responsible position where their physical ailment will be no hazard to them. Should their condition warrant absence from their work while undergoing treatment, they are placed on the sick-and-health benefit at a weekly rate of $20 until they are able to resume work. If they become permanently disabled or unfit for any work they are given insurance covering their disability, and in other cases are given a substantial part of their wages. In some of our companies this sick benefit averages 85% of salary according to length of service.

Any change of position which is necessary on account of health is recommended by the chief surgeon, and his efforts are directed toward maintaining the employee in gainful occupation with the company as long as it is humanly possible.

In addition to the periodical examination in the hospital car, examinations are conducted also at the Central Medical Department on employees who come to the department on account of illness or injury, no matter how trivial.

Mental Reaction Equipment Shown in the Interior of the Medical Car

If the employee comes in for a foreign body in the eye or any other ailment, before he is released back to duty he is given a thorough physical examination. In the course of the year we examine a large number of the employees in this manner, thereby reducing the amount of work in the hospital car.

Before any employee resumes his work after illness or injury, he is re-examined and given a return-to-duty slip. After all leaves of absence for more than two weeks, for anything else but illness, each employee must undergo this periodical examination and receive an "o. k." before resuming work. On all sick leaves the employee is re-examined and a record made of his condition. And before a transfer or promotion, and after all unusual occurrences such as an accident and breaches of operating rules, the employee is examined.

It was found impractical to have employees who

could not be reached by the hospital car come to the medical department, so it was decided that a more flexible examining unit was essential, and a medical motor coach was secured which was equipped thoroughly with all the instruments and office furniture properly to conduct the examination. The personnel consisted of a doctor, a registered nurse and a chauffeur. This coach travels out into the field where groups of employees are at work, and without disrupting their regular duties each man in turn is examined in convenient and comfortable quarters. With such quarters and facilities for this work, is it not reasonable that we have 100% cooperation from employees submitting themselves for the medical audit? The 20 years of this work have demonstrated its value to the employees. This same service is extended to employees' families gratis. In our files we have over 875,000 medical records of physical examinations and other medical conditions during these 20 years, and it is from these records that we derive our statistics—which we hope will prove useful to those who are still young in experience with periodical examinations, especially in industry.

Those engaged in industrial medicine and surgery, especially in the large companies, have often been assailed with the statement that the making of these periodical examinations by the industrial physician was taking away the private physician's patients and part of his income.

From my own experience as chief surgeon of a large number of industrial companies I can emphatically state that there need be no cause for concern as regards physical examinations made by the industrial medical department if they are correctly and efficiently performed. In fact they give work to the private physicians, who are securing fees for their services.

IN 1921, following the world war, it was seen fit to determine if possible just what percent of the people coming under our observation from outside sources and from among our own employees had a regular medical adviser and whom would they consult as the need arose. From the figures compiled, the following was apparent:

Employees contacted and from whom information was obtained	4,000
Persons having medical contact of one kind or another* (family physician, etc.)	52%
Persons having no medical contact	48%
Persons claiming never to have need of a physician's services	4%

* Of these only 46% were able to give the name of their physician.

Having so repeatedly been asked what are the findings in the usual periodical medical survey has suggested at this point my giving the results of a medical examination of a group of employees in the transportation industry (the group of 1932). This examination was made on all classes of employees, including both skilled and unskilled labor. Shopmen and maintenance of way employees were responsible for the greatest number of the defects found; station agents and crossing watchmen showing the next greatest number of defectives. (See opposite page.)

FROM a study of these results it will be seen that only a very small percent of the defective conditions found in a medical survey of a given group of employees necessitates their removal from the service of the company. Conscientious search for a placement of those unfortunate employees with physical defects in work that will fit their handicaps assures them that they will be an economic part of their company. How much better this method is than dispensing with the employees' services when they are worn out, or putting them on a pension basis when many years of good service can be had from them if they are given work that they can do.

I have not mentioned the mental and nervous examination that we have recently made a part of our medical survey, as that alone is of such extent that it would require a separate paper; suffice it to say that for 20 years we have given a great deal of attention to the mental factor as a cause of accident and absence from work.

SOME of the results of the past 20 years of employee health conservation through periodical medical examinations—in which the Chicago Rapid Transit Company was one of the pioneers—put into effect as a routine measure of health security may now be briefly enumerated:

1. The periodical medical examination has been a decided factor in reducing both the frequency and severity rate of accidents, as an employee with a healthy body and mind is more alert to the hazards of his occupation.

2. The complications and partial and permanent disabilities resulting from injury have been reduced to a minimum, and our company has been remarkedly free from the so-called back complications due to arthritis and infections.

3. Labor turnover has been reduced to a minimum in the companies that have put in effect this annual medical audit. Our placement of the employee in work that his defects will allow assures retaining him longer in the company, and there are not so many positions available.

4. There is no doubt in the minds of our officials that these annual surveys have been a very important factor in the prolongation of the average employee's

span of life. Discovery of so-called disabling diseases some 10 to 15 years ago and constant observation have resulted in the life expectancy of the individual being prolonged years. The average age at death for the past five years has been over 57. The annual death rate of employees during the same time has been on an average of 70 per year, including those deaths from accident, both on and off duty. If these are deducted, the average age would be close to 60 years and the annual death loss less than 60 per year. This I believe will prove the assertion that out of an average employee roll of 5,600 employees these averages merit credit to the physical re-examinations. The causes of death are about the same in all groups; heart diseases (3), cancer (4), pneumonia and deaths from old age as strokes (apoplexy) (2), arterio sclerosis, etc.

5. Absence from work due to illness has been reduced to the lowest point in the history of the medical department, and the employees off, receiving compensation from the sick benefit, averaged 30 per week for the past four years out of a total yearly average roll of 5,600 employees. The daily absenteeism on account of illness has likewise been reduced from the fact that conditions are detected in these periodical medical examinations which permit a cure in the early stages, and prevent the condition from becoming chronic with the accompanying absence from work factor.

6. The periods of convalescence, both from injury and illness, have been reduced from the fact that there has been a minimum of complicating conditions present, undetected, that would have prolonged the sickness if they had not been discovered at some previous health audit.

7. The point that merits great satisfaction has been the practical elimination of contagious and infectious diseases from among our employees. Our average rate of tuberculosis has been one case per year.

8. The freedom from gastro-intestinal troubles has

Number of employees examined in group and found free of defects	1,574
Number of employees examined and found to be defective	1,914
Total number of employees examined	3,488

	Employees	Defects
Employees having 1 defect	1,071	1,071
Employees having 2 defects	637	1,274
Employees having 3 defects	162	486
Employees having 4 defects	34	136
Employees having 5 defects	6	30
Employees having 6 defects	3	18
Employees having 7 defects	1	7
Total	1,914	3,022

Nature of Defect Conditions

High blood pressure	805
Defective sight—glasses correct	662
Defective sight—no glasses	609
Hernia (supported and unsupported)	243
Defective teeth	146
Low blood pressure	132
Defective heart	80
Defective color sense	66
Defective hearing	58
Hemorrhoids	57
Varicocele	32
Albumen in urine	27
Lung disease	21
Physical deformity	16
Hydrocele	15
Skin diseases	12
Sugar in urine	10
Nervous disease	9
Thyroid disease	8
Diseased tonsils	5
Genito-urinary disease	5
Infections	2
Varicose veins	2
Total Defect Conditions	3,022

NOTE: It will be seen that we include as defect conditions, defective sight corrected with glasses and hernia or ruptures that are supported by a truss. This is done on account of the fact that to be normal requires appliances, etc. In recording blood pressure we have taken anything above 140 systolic and 90 diastolic as a high reading. Also under physical deformity we record deformities that existed for years such as spinal curvature, round shoulders, amputations, etc. Under color defects we record those who cannot pass all four color tests perfectly. Those found color defective were in the shop department and not among the transportation or operating employees.

Disposal of the Defective Employees' Conditions

Those having glasses to correct sight before this survey	662
Those having hernia supported before this survey	173
Those employees with slight color defect in previous survey	66
Those with increased blood pressure, normal to individual	324
Those with deformities of permanent character	16
(Conditions counted from previous survey)	1,241

NOTE: The total number of defective conditions, 1,241, were corrected or considered as normal to the individual. With these previously corrected conditions deducted from the total defect conditions found in this survey, there was an actual total of 1,781 new defects found. Of these defects the following disposal was made:

Treated and returned to normal physical condition	1,376
Treated and physical condition improved and "o.k." for work	323
Treated and improved, but classed as permanent defect, "o.k." for work	74
Treated, but unable to improve, change of position necessary	8

Results of the Medical Examination of the Group of 1932

JAN. | FEB. | MAR. | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC.

PHYSICAL EXAMINATION RECORD

DATE EXAMINED

NAME ADDRESS

APPLICANT FOR EMPLOYED AS IN DEPT. CO.

DIVISION DATE OF BIRTH AGE YRS. MALE FEMALE WHITE COLORED SINGLE MARRIED NO. YEARS IN SERVICE

HEIGHT FT. INS. PRESENT WEIGHT LBS. USUAL WEIGHT STANDARD WEIGHT LBS. COLOR OF EYES COLOR HAIR

CHEST INSPIRATION INS. EXPIRATION INS. ABDOMEN INS. CAPACITY OF LUNGS CC.

PULSE (SITTING) PER MIN. PULSE AFTER EXERCISE PER MIN. SYSTOLIC PRESSURE MM. DIASTOLIC PRESSURE MM. PULSE PRESSURE MM.

SKIN SURFACE GENERAL APPEARANCE THIN MEDIUM FAT

DISTANT VISION RT. LFT. NEAR VISION RT. LFT. WITH GLASSES RT. LFT.

RANGE OF HEARING RT. LFT. CONVERSATION RT. LFT. DEGREE DEAFNESS

DRUM MEMBRANE RT. LFT. CANAL RT. LFT.

COLOR PRECEPTION GIVE NO. OF COLORS CALLED

HOLMGREN PUPILS OF EYES RT. LFT.

THOMSON REACTION TO LIGHT RT. LFT.

WILLIAMS REACTION TO ACCOMMODATION RT. LFT.

GREENE OCULAR COORDINATION RT. LFT.

IS COLOR BLIND, FOR EYELIDS RT. LFT

TEETH — 8 7 6 5 4 3 2 1 RIGHT; UPPER 1 2 3 4 5 6 7 8 LEFT; LOWER 8 7 6 5 4 3 2 1 — SCARS OR DEFECTS — RIGHT EYE — LEFT EYE

TEETH. DEFECTS GUMS

NOSE TONGUE TONSILS

CERVICAL GLANDS THYROID GLANDS VACCINATION

SKULL, FOR EVIDENCE OF FRACTURE OR DEFECTS

MUSCULAR DEVELOPMENT POSTURE NUTRITION

BREASTS AXILLARY GLAND SKIN

HERNIA RINGS OPERATION TRUSS NO TRUSS

VARICOCELE HYDROCELE GENITALIA

RHOMBERG MUSCULAR COORDINATION TREMORS

GRIP TESTS RT. LFT. JOINTS RIBS

ARMS HANDS LEGS FEET

SPINE MOBILITY CURVATURE

EVIDENCE OF OPERATION EVIDENCE OF FRACTURE

HEMORRHOIDS FISSURES INTESTINES

CHEST CONTOUR DEVELOPMENT

LUNGS

RESPIRATIONS BEFORE EXERCISE PER MIN. AFTER EXERCISE PER MIN.

HEART

RATE PER MIN. BEFORE EXERCISE PER MIN. AFTER EXERCISE PER MIN.

POSITION APEX BEAT DEFECTS

VISCERAL PTOSIS ABDOMEN INGUINAL GLANDS

LIVER SPLEEN KIDNEYS

PATELLAR REFLEX RT. LFT. GAIT

MENTALITY OF PATIENT

URINE
APPEARANCE SP. GR. ALB. SUGAR SEDIMENT

BLOOD. RED. CELLS WHITE HEMAGLOBIN WASSERMANN

FAECES BLOOD PARASITES FATS

SPUTUM DISCHARGES

FEMALE GENITALIA

MENSTRUATION

MAMMARY GLANDS

REPRODUCTIVE ORGANS

SUMMARY: DEFECTS OF FUNCTION AND STRUCTURES.
ERRORS OF HABITS.
HISTORY OF ALL ILLNESSES AND UNUSUAL OCCURRENCES.

ADVICE GIVEN.

RESULT OF EXAMINATION

CHIEF SURGEON.

SIGNATURE OF PHYSICIAN.

been very satisfactory; this in itself has resulted from the care of infectious processes, such as diseased teeth and tonsils.

9. There have been no cases in 20 years of man failure on the elevated trains, and no employee has died while in charge of a train.

10. A better physical make-up, free of diverting symptoms of disease, has resulted in a more efficient personnel, with less errors and mistakes, in all branches of the company.

11. The length of productive service of the employee has been a direct result of medical observation; and when we say that we have motormen of the age of 70 years driving trains with the skill and physical stamina of men of 40, the statement expresses the value of these frequent examinations.

IN conclusion may we bring out the most important feature of these annual medical examinations by saying that the value of this work is only in proportion to the thoroughness with which it is carried out, the persistence with which each employee's case is followed up, the insistence of remedial measures being instituted at the earliest possible moment to correct the conditions found and saneness in determining what constitutes a physical defect, and what position the physically defective employee can be assigned to with the assurance that he will be a safe person to have around.

Only a clean-cut, straight-forward and aboveboard policy in this service to the employees will register success of the company's efforts. There can be no ulterior motive back of the medical policy. Observance of these factors alone will make for the success of employee health conservation as a substantial asset in industry.

Increased Compensation Rates

ON August 1, 1932, compensation insurance companies had filed new schedules of rates in several states. In amount these new rates varied from 15% in Connecticut to 26.9% in the District of Columbia.

This action followed shortly after the last meeting of the National Council on Compensation Insurance, the association of compensation writing insurance companies. On that occasion it was voted to increase compensation rates as follows:

Allowance for increased indemnity	1.0%
Increased medical cost	3.8%
Contingency	4.3%
Effect of wage reductions	10.7%
Total	19.8%

Traumatic Hernia and the Compensation Law

BY JAMES W. DAVIS, M.D.

THE compensation law in North Carolina has been one of the greatest of helps—not only to the employer, who is automatically protected from damage suits, but also to the employee and to the doctors who treat industrial cases.

Hernia has presented some problems which have been difficult to settle satisfactorily, but it does deserve a great deal of consideration.

Compensation is allowed for a hernia only when the following five points are definitely proved to the satisfaction of the Industrial Commission:

"In all claims for compensation for hernia or rupture, resulting from injury by accident arising out of and in the course of the employee's employment, it must be definitely proved to the satisfaction of the Industrial Commission:

First: That there was an injury resulting in hernia or rupture.

Second: That the hernia or rupture appeared suddenly.

Third: That it was accompanied by pain.

Fourth: That the hernia or rupture immediately followed an accident.

Fifth: That the hernia or rupture did not exist prior to the accident for which compensation is claimed.

"All hernia or rupture, inguinal, femoral or otherwise, so proved to be the result of an injury by accident arising out of and in the course of the employment, shall be treated in a surgical manner by a radical operation. If death results from such operation, the death shall be considered as a result of the injury, and compensation paid in accordance with the provisions of Section 38. In non-fatal cases, if it is shown by special examination, as provided in Section 27, that the injured employee has a disability resulting after the operation, compensation for such disability shall be paid in accordance with the provisions of this act.

"In case the injured employee refuses to undergo the radical operation for the cure of said hernia or rupture, no compensation will be allowed during the time such refusal continues. If, however, it is shown that the employee has some chronic disease, or is otherwise in such physical condition that the commission considers it unsafe for the employee to undergo said operation, the employee shall be paid compensation in accordance with the provisions of this act."

The compensation law covers all types of herniae or rupture, but the vast majority are of the inguinal type.

When we consider the fact that practically all herniae, especially of the inguinal type, are really present in a potential form from the time of birth, it must be admitted that hernia must be looked upon as a different kind of injury from a fractured bone or a crushed finger.

In the first place there is a preformed sac which may remain so throughout life, or, as is often the case, a slight strain in an unusual position may cause a loop of intestines to slip through the internal ring into the sac, thereby fulfilling technically all of the five points demanded by the compensation law before a hernia is compensable.

Unfortunately at operation there is no way of telling definitely whether or not the hernia has ever been down before or how long it has existed unless there are some adhesions or some other similar evidence of previous trouble.

Most of the individual cases which have come up before the Industrial Commission for a hearing, having been contested by the insurance companies, are contested because the insurance companies claim that the hernia was present before or that it *did not* follow injury.

A true traumatic hernia is very rare. Only when there is a preformed sac with a potential opening is it possible for a hernia to occur suddenly except in very rare cases.

Usually the employee states that the hernia followed a strain or a fall or, as happened in one case, the employee stated that it appeared after an accidental blow in the groin when he was struck by the end of a piece of timber.

As a matter of fact the statement of the employee himself who develops a hernia is the principal factor in the decision as to whether or not the hernia is compensable. The employee's statement that there was an accident accompanied by pain and that the hernia appeared suddenly immediately afterwards and had never been present before fulfills the requirements of the law and makes the condition compensable.

It is a well-known fact that many patients who have a hernia keep this concealed from their family, and even their closest friends do not know it; and it is very easy for some one who is unscrupulous to take advantage of this fact.

My experience with insurance companies has been that they are universally fair to all employees in compensation cases and are always willing to do what is right. I am also convinced that the insurance companies are imposed upon in many cases. The compensation law is a good law and it should be adjusted and the rulings of the commission changed so that both the insurance companies and the employees get just consideration in such cases.

It is my opinion, however, that hernia should receive special consideration and that, in preventing any injustice either to the employee, employer or the insurance company, every employee should have a careful examination which is recorded and the record filed with the employer. Hernia or any other congenital or acquired defects could thus be ruled out of any future disability claim which the employee might have. In addition to this a general physical examination would be a great help to the employee.

The following conclusions are justified:

1. The occurrence of traumatic hernia is very rare.
2. The existence of a preformed sac which amounts to a congenital defect makes the occurrence of a simple, indirect, inguinal hernia very easy under certain circumstances.
3. A hernia due to such congenital defect may fulfill the five requirements of the compensation law and be compensable, and yet, if we take into consideration the anatomical cause, it really should not be compensable.
4. There should be some change in the ruling regarding hernia in justice to both the employees, the employers, and the insurance carriers.
5. A careful physical examination before an employee starts to work will eliminate many controversies. While this may not solve all of the problems it will help a great deal.

References:

Davis, James W.: Hernia and the Compensation Law, *Southern Medicine and Surgery*, August, 1931.

Bulletin, North Carolina Industrial Commission. Volume 1, No. 1. May, 1929.

Instalment Fees

A SPECIAL committee of the Medical Society of the County of New York, appointed to investigate the results of a financing plan which has been in an experimental stage for more than a year, has approved the plan and recommends it to members of the society. The action of the committee is said to be unprecedented in American medical history. A bureau extends to its member doctors a complete and unified method of handling their collections. The patient who has contracted for, or is about to contract for, medical treatment, agrees over his signature to pay his obligation over a period of 10 months in uniform monthly instalments. Interest at the rate of 6% per annum on the deferred balance is charged for the financing, amounting to only $2.75 per $100. The transaction is completed in the privacy of the doctor's office. The endorsement of but one other person than the patient is necessary, and the agreement, which then becomes a note, is discounted for the doctor by an industrial banking institution.

Precision Manufacturing

—Some Curious and Interesting Angles of Accident Prevention Therein—

by

SANFORD DEHART,

Director of Hospital and Employment Departments, The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.

DURING the past 10 years we have made an assiduous study to ascertain the causes of accidents in our shop, what injuries cause the greatest loss of time, and what remedies may be applied.

That we have succeeded is illustrated by our accident statistics, which show that each year our lost time due to injuries incurred in the shop has been reduced.

The results in time saving to both workman and shop by an accident prevention program are seen in the fact that in the LeBlond plant the first year we started our accident prevention plan there were 560 days lost because of accidents, and this number was reduced to 151 days in less than two years. Out of a total of 837,773 working man-hours only 1,364 man-hours were lost during the second year, or considerably less than one-fifth of 1%. Reducing this to working days, it means that an average of only about one-fourth of a day per workman was lost during the entire year from all classes of injuries, even those considered slight and of frequent occurrence. Our experience has convinced us that most lost-time accidents can be prevented by proper instructions.

Our records show that by far the greatest loss of time is due to strains from improper lifting. Falls suffered by the workman, or the dropping of objects on the feet and legs, are the next important causes of lost time. The fingers are the most exposed part of the anatomy of the machine operator, and are more often injured slightly, while the legs and feet are most frequently seriously injured by falling objects. The abdominal and back muscles are the most vulnerable to strains and ruptures. It seems that some feet are positively magnetic when it comes to attracting heavy objects to them, and it also seems that a change in the law of gravitation would be the only possible chance of eliminating this attraction. However, much can be done to eliminate this type of injury by proper instruction.

The hospital department of any plant is a clearing house, through which the injured must necessarily pass. If the medical director is alert, he can usually make remedial suggestions, so that at least the same condition is not productive of a similar accident, even though he may not have originality enough to anticipate accidents, or sufficient engineering skill to design a guard. It may sound platitudinous to say that the prevention of industrial accidents is as much a selling problem as it is an engineering problem, but it is, nevertheless, worth reiteration. It is a selling problem not only to the workman and foreman but to the higher executives as well.

I can best illustrate this by relating an incident that happened in our plant. Our records showed that there were a great many men coming into our hospital from the paint department, with foreign bodies in their eyes. Many of them were suffering from respiratory conditions. These men were kept under observation for several months, and were instructed to wear respirators to prevent industrial respiratory conditions, and goggles to prevent the foreign bodies blowing into their eyes. Notwithstanding all the safety education, there was very little accomplished in reducing the hazards of this department. Traumatic conjunctivitis, blepharitis and keratitis were particularly prevalent. We conferred with our engineering department, and with their cooperation an exhaust bench was installed, which has practically eliminated these conditions.

A brief description of this device will not be inappropriate. It is simply a bench built along standard lines, connected with an exhaust fan system. The dust, dirt, lead and other ingredients of the paint are sucked through this exhaust system, through grill work in the top of the bench, and disposed of outside the shop. The benches are of the standard type adopted for work benches, being made of standard and interchangeable units, and assembled as required. Each of the grills is connected by an independent duct with the main exhaust line, which parallels the length of the bench and is connected to a large fan, which exhausts into a vertical duct running through the building. The results from this device have been gratifying.

ACCIDENT prevention is curious and interesting in its manifold angles. For instance, a factory employing many thousands of persons considers $2,000,000 a year spent in keeping the plant clean a good investment. The management is of the opinion that cleanliness and safety are analogous.

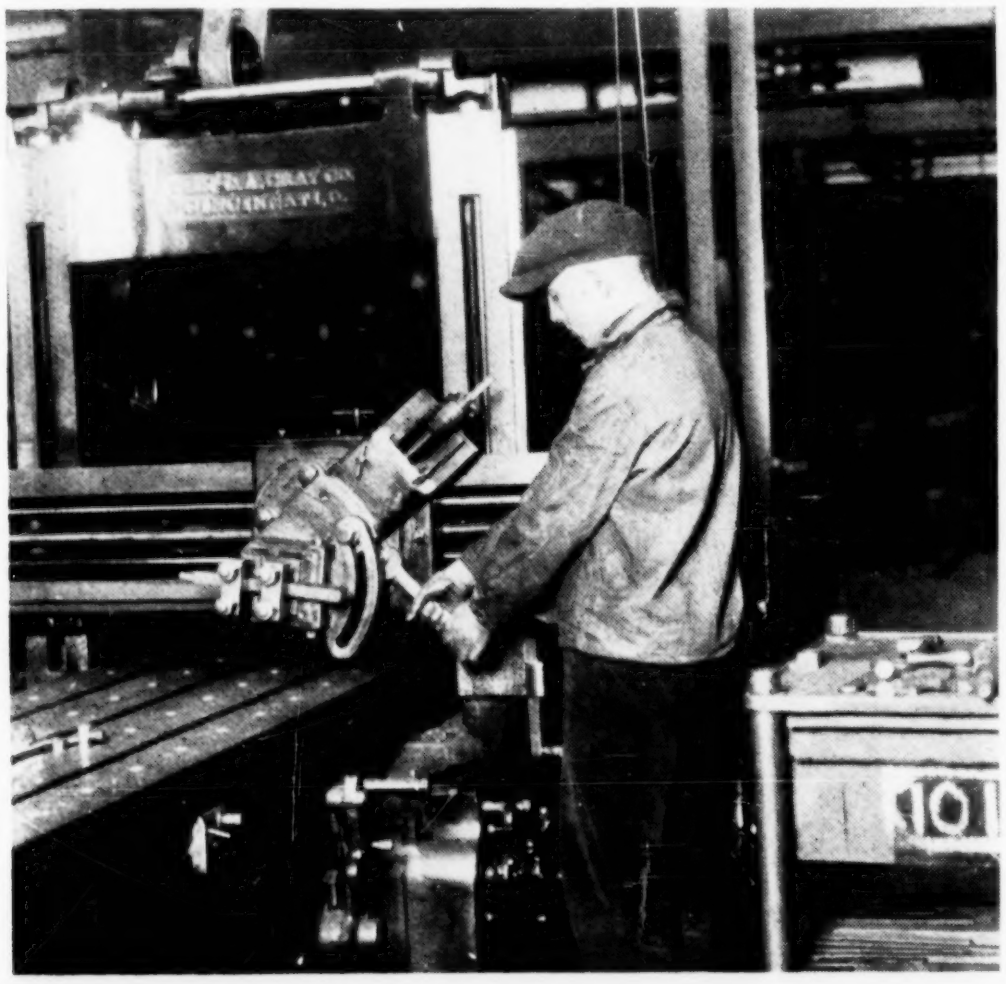
Another instance is that of a manager of a machine shop, who was experiencing considerable trouble with a department in which several boring mills were located. The employees were reluctant to work in this

department, owing to their suffering from acute respiratory conditions superinduced by inhaling the dust. The company installed a blower system costing $12,000, all complaints ceased, and as a result labor turnover was greatly reduced. If you have read this far you will say: "That sounds all very well for the big corporations, but where does the employer come in who is employing fewer than a thousand persons." The company with a personnel of fewer than a thousand has an easier proposition with reference to accident prevention than the employer who is employing many thousands. He has two great advantages over the large employer, viz., the personal touch and a knowledge of the idiosyncrasies of the employee.

PRACTICALLY all shops, regardless of size, engaged in precision tool manufacturing have grinding wheel hazards.

The grinding wheel department of any plant is the one department which furnishes an incentive to the industrial physician to continue to preach accident prevention. Grinding wheels are productive of serious eye accidents due to flying sparks becoming embedded in the cornea of the operator's eyes.

An idea of the economic value of reducing eye accidents is illustrated by our records, which show that the first year our accident campaign was inaugurated to minimize the severity of eye accidents, 5,016 foreign bodies were extracted from the eyes of our employees. In four years our records show that instead of more than 5,000 foreign bodies being removed in one year at a cost of more than $3,000, there were only 789 pieces removed in one year, at a cost of $7.50.



Dangerous Way to Tighten a Nut

We find that much can be accomplished in the shop hospital by educating the worker in the importance of wearing goggles, and using guards to prevent eye injuries. A workman is a very receptive auditor right after a difficult foreign body has been removed from his eye, and this education is usually lasting.

Most manufacturers of grinding wheels provide a hooded guard to withstand the shock of the bursting wheel. The guard is adjusted close to the wheel and extends over the top to a point at least 30° beyond a vertical line drawn through the center of the wheel. Grinding wheels should, when practicable, be provided with safety flanges.

Right Method of Tightening a Nut

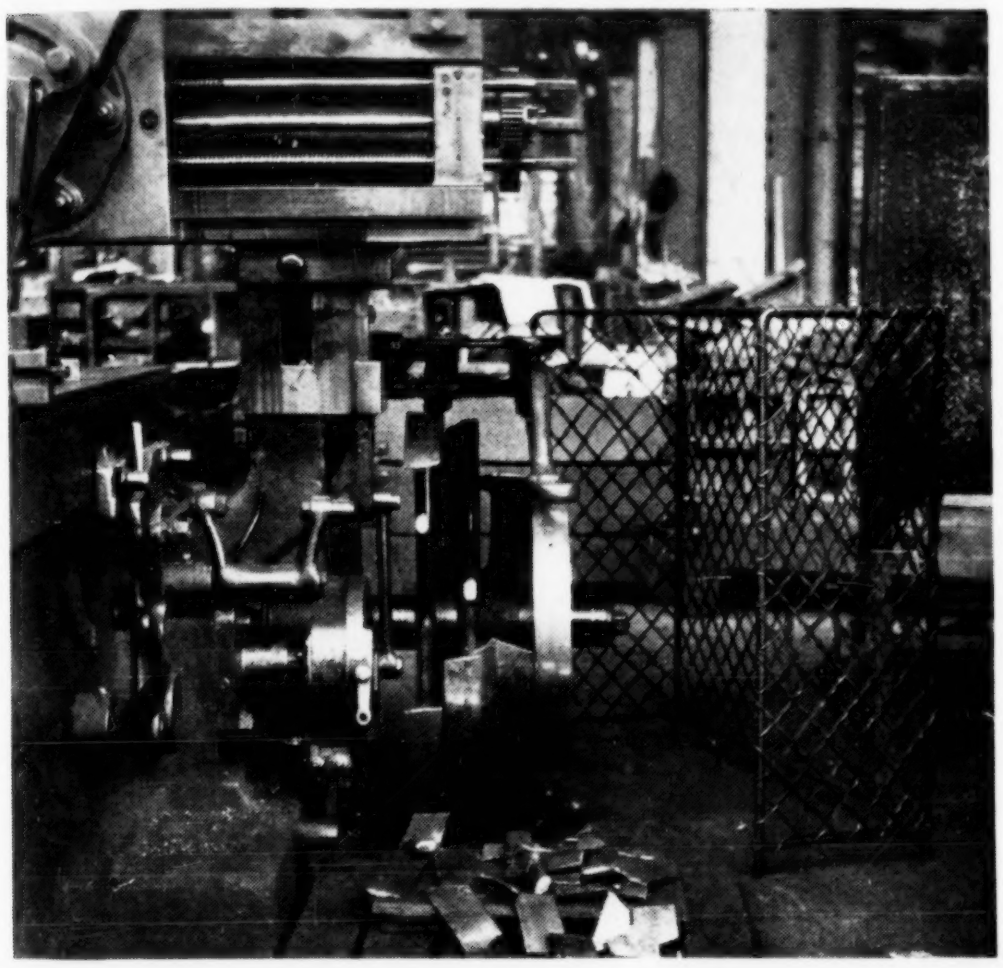
The principal function of the industrial physician in connection with grinding wheels is to see to it that the guards are in proper place, that they are not removed, that they do not interfere with the operation, and that the operators wear goggles. An approximate idea may be gained of the hazard present in grinding wheels, when it is taken into consideration that in actual practice wheels are run at a surface speed of from 4,000 to 6,000 feet per minute up to as high as 7,000. To reduce the hazard of breaking, engineers recommend that for most operations the speed should not exceed 6,000 feet. As a wheel wears down, the speed is increased to maintain the same surface speed, and great care must be exercised when a new wheel is provided, to avoid over-speeding.

Among the other hazards of the precision tool manufacturing plants that might be, and usually are, productive of injuries are oily floors which become slippery. Mopping floors with a solution of sal soda will greatly minimize this hazard.

Crowded aisles are another hazard. We find that safety aisles, one for "up" travel and one for "down"

travel, do much to minimize accidents. Our trucks are equipped with a horn to warn of their approach. We find, as others have found, that the internal transportation of materials almost invariably presents a serious danger.

It is well known that defective tools and appliances are always a source of injury to the workers. Broken hammers or chisel handles, wrenches, screw drivers, mushroom-headed hammers, all contribute their quota



Showing the Value of Machine Guards

to the accident list, and many times they exceed their quota.

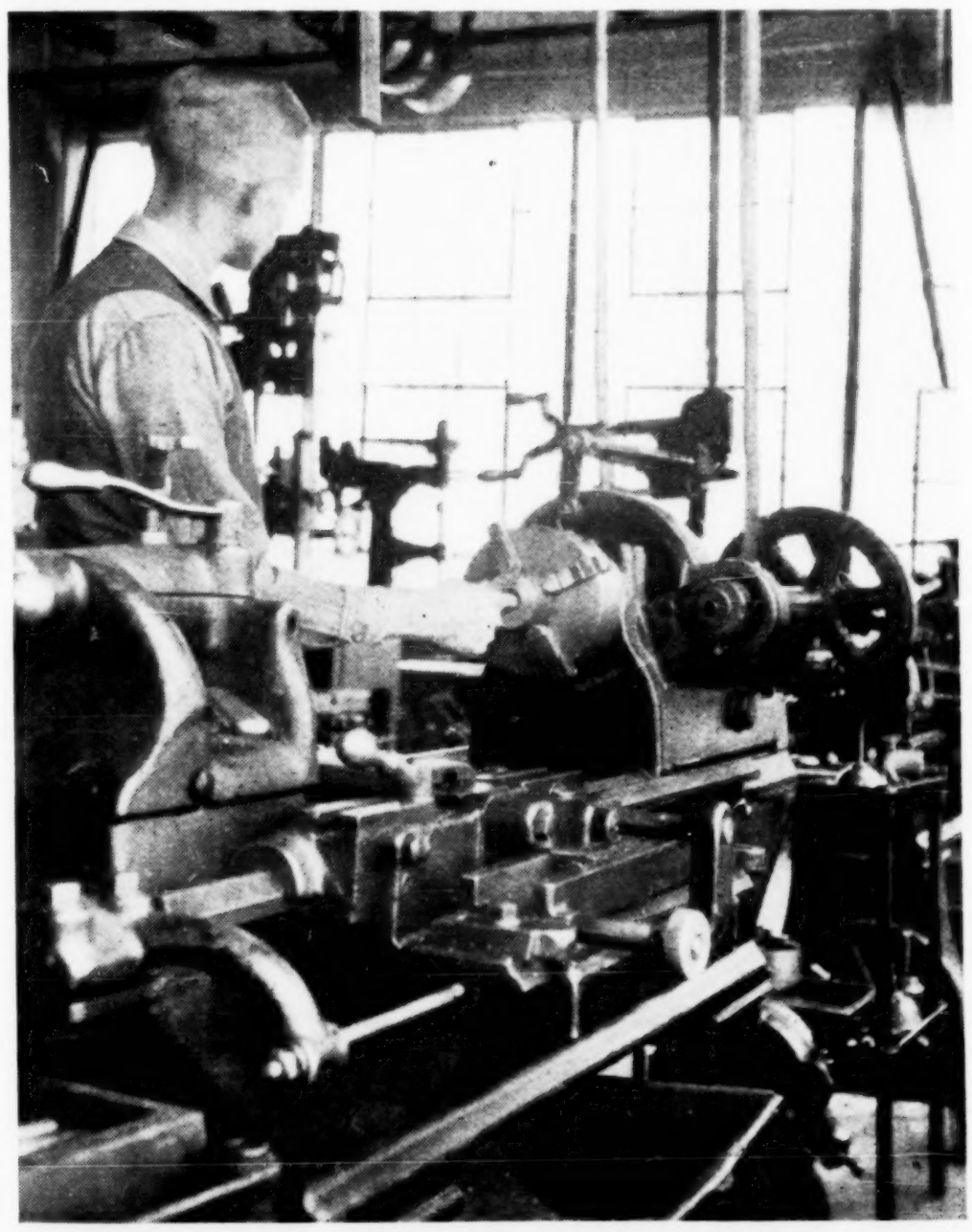
We have found the medical attendant is usually informed of the danger of the workman using defective tools, *via* some workman coming into the hospital with an injury from that cause. This is the medical attendant's cue to make, as far as may be possible, a general survey of the tools in use. This usually requires some tact, but it always is accomplished.

Sacro-iliac sprains are usually very common in plants of precision tool manufacturing, and they are the bane of the medical attendant's life. We have greatly reduced our "sprained back cases" by teaching the men in heavy lifting departments the proper way to lift. In arduous occupations the workers are examined frequently. This procedure has done much to obviate the perennial controversies concerning the origin of hernias.

There are numerous other hazards in plants engaged in precision tool manufacturing, but they are so obvious it would be presumptuous to reiterate them. I have mentioned only those hazards which our records show have had an important bearing on our accident problems. That these hazards were responsible for our accident frequency and severity rate we have no reason to doubt. Where these defects were found, they were remedied and their correction has been an important factor in obtaining the results mentioned.

Perhaps the apprentice requires a little more supervision by the industrial physician than the journeyman. The apprentice must be adjusted to his new environment; he has the insatiable curiosity of youth which frequently gets him into trouble.

Not long ago one of our apprentices was tapping a milling cutter, in which he placed his finger to ascertain whether the cutter was threading properly. Before he could remove his finger the cutter had run up on his finger and encased it in the cutter. Fortunately, he had sufficient presence of mind to shut off the machine. When he came down to the shop hospital the cutter was so thoroughly threaded on his finger it could not be removed by ordinary means, because of the swollen condition of the finger. A portable vise was obtained from the shop, the finger encased in the cutter was placed in the vise, and with



Took Vise, Hack Saw and Chisel to Get His Finger Out

the aid of a hacksaw and chisel we were able to remove the cutter. After the cutter was removed it was found the patient had sustained severe lacerations of his thumb, index finger and second finger. The laceration extended from the distal to the proximal phalanges, exposing the tendon sheath of the extensor pollicis longus. With the exception of a temporary tenosynovitis of the thumb, the patient had an uneventful recovery.

Preventive Medicine and Mutual Aid

—And the Place of Both in a Working Relation That Will Minimize Lost Time—

by

C. F. N. SCHRAM, M.D.

Chief Surgeon

Fairbanks, Morse & Co.

WHO *was born on a farm near Flint, Michigan; got his early education in a country school; attended Flint High School, Berea Academy and Western Reserve; completed college work at Oberlin in 1908; graduated in Medicine at Columbia University in 1916; followed with an interneship at White Plains Hospital, White Plains, N. Y.; and in June, 1917, was appointed Chief Surgeon for Fairbanks, Morse & Co., at Beloit, Wisconsin.*

THE TOPIC is a timely one. The persons gainfully employed in the United States lose 250,000,000 days annually and the employees' and employers' loss is over $3,000,000,000, due to things that ought to be headed off by preventive medicine.

If we can read the signs of the times, we have reached the economic bottom and are actually on the up-grade. It is not my province to discuss why I think so, and if I am wrong I can claim the universal privilege of guessing again. But whether or not we are on the up-grade in business, there are some depression lessons that we should have learned and learned well. We were just as profligate with our health as we were with any of the other items that go to make up wealth. Personally I think health is the most important item among the assets which go to make up wealth, but, of course, being a physician I am biased.

By the intelligent use of known methods, 90% of sickness could be avoided. Sickness not only ranks first as a personal reason for lost time from work, but it also equals or surpasses all other personal reasons combined. It causes about 15 times as much lost time as does the compensable injury, but that is true only since we reduced shop injuries 70%. Did this latter reduction pay? Will the reduction of this other enormous illness loss pay? It was decided, legally, that the employer should bear the expense of the loss due to injury in the shop, but the actual reduction of the injury loss was the job of all of us. We were educated to the fact that the "shop injury" was a by-product which could not be used and, therefore, was a total loss.

The expense of lost time from illness has been borne by both employer and employee and is a non-usable waste. It cannot justly be handled as the injury loss was, by making the employer responsible. The employer loses probably as much as, if not more than, the employee loses, when the latter loses time that is needed at his work. But the very great percentage of illness is not due to shop conditions; it is due to conditions over which the employer has little or no control.

How then are we to solve this problem and profit by our mistakes? It is a mutual problem. Is not then our mutual aid association the logical place to start? It is in industry; it is a going concern; it has the backing of both employer and employee, and while it will take some drastic changes in the set-up of the great majority of mutual aid associations, yet I think that the job belongs to it.

Some will ask what drastic changes are necessary. The mutual aid associations have provided a mutual insurance partially covering the loss in wages. They may say they have been paying from $1 to $2.50 per day to members when "off sick." So have the physicians been taking care of people when they were ill. Both the paying of the sick member for his wage loss and taking care of him when he is ill are laudable, praiseworthy achievements, but if we have learned our depression lessons we must make provision so that the employee will have little or no wage loss from illness and the employer the same.

WE have fixed up some pretty efficient ambulances, but as fence builders we have not been so good. Nevertheless, I repeat, if we have learned our lesson it is our job.

This fence cannot be a one-man affair and it cannot be builded by either one of the two parties most concerned, i. e., the members of the mutual aid association or the local physicians. These *two* groups can solve the problem, and working together they are the only ones who can solve it. The fence they build will

not eliminate all sickness, but neither have the compensation laws eliminated "shop injury." But a 70% reduction of our employer and employee loss from illness would make a gross saving of over $2,100,000,000, and we can spend quite a sum of money on a fence that will do that. The drastic changes suggested for the set-up in our mutual aid associations are twofold. We must put an economic urge behind the physician to keep the members well, and we must take away from the members the economic hurdle that they feel is present and keeps them from getting preventive service. The only reason for this enormous waste from sickness is that we wait until something that did not amount to anything amounts to something before going to the doctor. That has been the usual, and we of the human race are prone to follow precedent.

A few mutual aid associations have been pioneers, and they have bought preventive medical service and have included in it medical, surgical and hospital care when needed at a cost of $2 per month per member, and they say it pays. Some members of the mutual aid association will think this is too much, and some of the doctors will probably think it is not enough. Some doctors will even say that it is not ethical. If I could evolve a plan that would make a net saving to the gainfully employed and their employers of this country of $1,236,000,000, and reduce the illness 70%, and lessen to a like degree its attendant uncomfortableness and suffering, and so arrange it that the local physicians could do the job (and they are the only ones who can do the job), then I would be willing to be called unethical or most anything else.

The reason I have emphasized the part the local physicians must play in this plan is that I want the members of these mutual aid associations to have group service. The individual industrial physician in the large plant can do much for the members of the mutual aid association of that plant to reduce illnesses, but the practice of medicine and surgery is too broad for one man to be proficient in all features of preventive medicine, and that time is past when intelligent folk except one physician to care for everything from alopecia to ingrowing toenails. The dermatologist who cures a case of ringworm by correctly diagnosing it early and treating it properly is doing a good job in preventive medicine. Preventive medicine consists of a much larger program than sanitation and the control of epidemic diseases. As applied to the mutual aid association it means, in most instances, early diagnosing and proper treatment. The mutual aid association needs this type of preventive medicine and it takes a group to give the best of service. They need not all be specialists, and there is little need for the extreme in specialization. But in any group of physicians one will find that one man is interested along a certain line and another along some other line, and we do a better job at those things we like to do, and this applies to medicine as well as to other lines of activity. The group idea also gives a reasonable latitude in personal choice of physicians.

In conclusion I would state that I firmly believe that we physicians have facing us an unparalleled opportunity for service to the wage and

THE FENCE OR THE AMBULANCE

'Twas a dangerous cliff, as they freely confessed.
Though the walk near its crest was so pleasant.
But over its terrible edge there had slipped
A duke and full many a peasant.
So the people said something would have to be done, But their projects did not at all tally:
Some said, put a fence around the edge of the cliff.
Some, "An ambulance down in the valley."

But the cry for the ambulance carried the day,
For it spread through the neighboring city:
A fence may be useful or not, it is true,
But each heart was brimful of pity
For those who slipped over that dangerous cliff:
And the dwellers in highway and valley,
Gave pounds or gave pence, not to put up a fence,
But an ambulance down in the valley.

For the cliff is all right if you're careful, they said,
And if folks even slip or are dropping,
It isn't the slipping that hurts them so much
As the shock down below when they're stopping.
Then an old sage remarked, It's a marvel to me,
That people give far more attention
To repairing the results than to stopping the cause,
When they'd much better aim at prevention.
Let us stop at its source all this mischief, cried he;
Come, neighbors and friends, let us rally.
If the cliff we will fence we might almost dispense
With the ambulance down in the valley.

Oh, he's a fanatic, the other rejoined:
Dispense with the ambulance? Never.
He'd dispense with all charities, too, if he could:
But no, we'll protect them forever.
Aren't we picking folk up just as fast as they fall,
And shall this man dictate to us? Shall he?
Why should people of sense stop to put up a fence
While the ambulance works in the valley?

But a sensible few, who were practical too,
Will not bear with such nonsense much longer.
They believe the prevention is better than cure,
And their party will soon be stronger.
Encourage them, then, with your purse, voice and pen, And while other philanthropists dally
They will scorn all pretense and put up a stout fence, On the cliff that hangs over the valley.

Better guide well the young than redeem them when old,
For the voice of true wisdom is calling:
To rescue the fallen is good,
But 'tis best to prevent them from falling;
Better close up the source of temptation and crime
Than deliver from dungeon and galley,
Better put up a fence round the top of the cliff,
Than an ambulance down in the valley.

salary earners of this country. This service must be one not only of prolonging life but also of making life more livable. The mutual aid association provided a group who have for years had a service idea. Their present program enlarged and made cooperative with the physicians has unlimited possibilities in making our next period of prosperity a more lasting, more enjoyable, more livable, more healthy and, therefore, a more wealthy one.

New Rules in Ohio

OHIO Industrial Commission, in an attempt to "eliminate overcharges and an excessive drain on the state insurance fund" has promulgated new "Rules and Regulations for the Guidance of Physicians, Hospitals, and Nurses," effective September 15, 1932. These rules, published by the Medical Division, Department of Claims, Industrial Commission of Ohio, are as follows:

RULES AND REGULATIONS FOR THE GUIDANCE OF PHYSICIANS, HOSPITALS AND NURSES:

1. It is the duty of the physician to submit a report of progress at least every 30 days in all cases where disability exceeds this period. Approval of bills will be based largely on the information given in the written reports furnished *during the progress of the case*, provided the reports disclose the actual facts.

2. If the claimant suffers from any disability or disease independent of the injury, it is the physician's duty to inform the commission *promptly*.

3. Fees will not be approved for treatment by more than one physician or surgeon for the same injury or disability over the same period of time. This does not apply to consultants, anesthetists, assistants or cases where the need of an ophthalmologist is clearly shown.

4. A claimant shall not be permitted to change from one doctor to another or from one hospital to another without setting forth his reasons in writing and obtaining the written consent of the commission for such transfer. A copy of such written request will be furnished the last attending physician or hospital. This does not apply to cases referred to a specialist by the attending physician when the nature of the case warrants nor to transfers made immediately following emergency or first-aid services. (See Rule 3.)

5. Flat fees shall not apply to cases which terminate fatally within one week after the date of injury, but the fees approved will be based on the attention given as reported by the attending physician.

6. Fees for daily dressing will not be approved unless the proof of record clearly shows the necessity. (In most cases wounds heal much more rapidly when the dressing is not disturbed too often.)

7. Fees for electrical treatments, x-ray treatments, massage and all other types of physiotherapy will not be approved unless written authority has been given in advance.

8. Upon the completion of treatment in all compensation cases, physicians shall promptly notify the commission and in addition thereto shall render their final bills, on forms provided by the commission, within 60 days thereafter. In cases requiring prolonged treatment, physicians may file partial bills, fully itemized, at intervals of 60 days. The questions on the reverse of Form C-19 shall be fully answered in all cases.

9. Except in emergencies or where the condition of the patient might be endangered by delay, consent from the commission must be obtained in advance where plastic or reconstructive surgery is contemplated or where open bone surgery in the later reduction of fractures is required. No bills for major surgery will be approved, even when authorized, until a copy of the hospital record of operation has been placed on file.

10. No fees for hospital care for more than one day will be approved where the proof on file indicates that claimant is ambulatory, unless the case is unusual in nature, in which even the attending physician shall explain in detail why additional hospital care was given.

11. When a claimant has reached the state where further hospital residence becomes a matter of personal convenience only, it is the duty of the hospital superintendent or executive to notify the commission at once. When a claimant is confined to a hospital for an extended period, bills must be filed monthly with the hospital record covering the period of the bill.

12. No hospital bills will be accepted unless a brief history of the case sufficient to show the nature of the injury and character of the treatment is given on the face of the fee bill blank or attached thereto.

13. In cases of urgent necessity a special graduate or registered nurse may be furnished for not to exceed seven days. Written authority must be obtained in advance for all services in excess of seven days. The fee for 12-hour duty is $5 and 20-hour duty $7. These fees include board on all hospital cases.

14. Fees for practical nursing service by a member of claimant's family or any one else will not be honored unless written authority has been obtained in advance. The fee in each case will be fixed by the commission.

15. The commission reserves the right to reject bills for hospital, medical or nursing care unless proof submitted clearly shows the necessity of the services charged for.

16. When the medical limit of $200 has been reached, further fees for medical, hospital and nursing attention will not be approved by the commission except in unusual cases, wherein it is clearly shown that the actually necessary medical, nurse and hospital services and medicines exceed the amount of $200.

MEDICAL ONLY CLAIMS—FORM C-3

1. In all "Medical Only" cases in which the medical treatment does not exceed two weeks, Form C-3 shall be filed not later than one month following the date of injury. If medical treatment is not completed at the end of two weeks, the physician shall file Form C-3 at that time, submitting at the same time a complete report showing the need for further treatment, upon receipt of which the commission shall furnish the attending physician with the file number of the case and with Form C-19 blanks to be used by the physician in making semi-monthly reports showing why treatment is continued and for filing supplemental fee bills. The payment of medical bills in cases requiring more than two weeks' treatment will depend entirely upon the reports the attending physician submits to the commission.

2. If any operative treatment other than first-aid or emergency operation is needed, a complete report shall be filed describing the condition and the operation necessary, and asking and obtaining authority for such operation before proceeding with it.

The Exit Medical Examination

—Having the Valuable Feature—Among Others—of Creating an Estoppel Against Ex-Employee Claims—

THE VALUE of a medical examination for workers at the time of employment and at regular intervals thereafter, is becoming quite well recognized.

The initial examination determines the suitability of an applicant for employment under the compensation act, and his fitness for the particular job to be filled.

Subsequent periodic examinations are essential in maintaining a high health status among a group of workers since physical defects, disordered physiology and incipient disease processes are discovered at the time when remedial measures are of maximum value.

A third type of examination, probably much less employed than the other two, is one made at the time employment is discontinued by reason of quit, lay-off or dismissal.

If the exit examination is carried out as a routine and regarded as a part of the employment agreement the employee can not logically object to it since he receives a distinct benefit from it as well as the employer. Indeed, men will occasionally ask for a certificate showing their physical condition in order to facilitate finding a job elsewhere.

The final inventory of the worker's physical condition serves a number of useful purposes valuable to both the employer and the employee. In addition, there is opportunity for a full consideration and understanding by both parties of the circumstances leading to the break in service.

From the standpoint of employer liability for personal injuries, occasional disease and the industrial aggravation of non-industrial disorders the final examination may reveal a number of interesting conditions. At this time the degree of any disability resulting from personal injuries occurring during employment may be determined and new injuries, or injuries that have been neglected but which may later cause disability may be detected. By retaining control over such workers as may later present liabilities, the employer not only satisfies himself as to the character of the treatment administered, but is in a position to determine the truthfulness of claims made by former employees.

Consider the man who deliberately neglected a potentially serious bone injury, and attempted to quit his job so he might take another one. Still further neglect of the injury might easily result in permanent disability to some degree for the man and to considerable confusion for both the old and new employer, except for the fact that the injury was discovered on exit medical examination and proper treatment given. Again, what difficulties might grow out of the case of the laborer who was hired but for a few days and when given a lay-off was found to have a beginning ulceration of the cornea of the right eye quite possibly due to irritating chemicals that he had been handling. Early discovery of the condition permitted prompt and effective treatment, thus, quite possibly, saving the employer the expense and inconvenience of a disability claim as well as preventing a certain degree of disability for the worker.

While it is quite true that under the compensation acts the employee must notify the employer within a definite time of any accident from which he may have suffered, yet it is a rare man indeed who cannot recall quite distinctly that he reported his mishap to his foreman immediately. Still further, it is marvelous at times how many witnesses can be produced when the claimant is asked to prove the occurrence of the injury.

Careful and complete records with x-ray pictures, laboratory tests and even an examination by a second physician may be advisable. Each type of injury must be handled as an individual case. Thus, the man who may later present a claim for hernia should be carefully examined by two physicians, so that they may definitely state that a hernia was not present. Back injuries require x-ray pictures, not only for diagnosis but as a permanent record as well. The liability, confusion and inconvenience that may arise in "back cases" justify a careful and complete consideration of all such injuries, real and alleged, as may come to the attention of the physician. The man who suffered a comparatively insignificant contusion of the back and who shortly thereafter suffered a second back injury in an automobile accident that caused him to remain in the hospital for eight months was unable to connect his long disability with the first accident because of complete x-ray pictures.

Occupational diseases are often insidious in their development and unless those exposed to these hazards are examined carefully at the time employment is interrupted, future liabilities may arise through the subsequent development of such diseases. This is particularly true with lead workers in whom the worry and disturbed routine of life accompanying a lay-off is often sufficient to precipitate an attack of lead poisoning. In one instance, a worker in an occupa-

tional disease hazard, although not suffering from occupational disease, was in a state of impaired health on final examination and a subsequent investigation was made. He was found in a distressing condition, acutely ill, impoverished and receiving irregular and inadequate medical attention. Arrangement for proper attention showed the man to be suffering from tuberculosis. A prolonged period of sanitarium treatment restored his health and re-employment again made him a worker, happy and useful to himself and his employer.

Another phase of employer protection against unjust claims is brought out by the failure of many employers to require medical examination at the time of employment. Unfortunately there are certain individuals who will make a false claim of injury or disability for the sake of securing a settlement, in fact, the casualty insurance companies assure us that there are certain persons who attempt to make a livelihood through just such claims. When no record of the claimant's physical condition is available it may be difficult if not impossible to disprove such claims and settlement on the best terms obtainable may prove the logical course. However, if careful and complete records are kept, x-ray pictures are taken and laboratory tests are made, the very fact that such evidence is available is a great deterrent to the filing of unwarranted claims and when legitimate claims are made a scientific basis has been laid for an equitable settlement.

During the examination the employee is given the opportunity to say how he liked his work, whether he wishes to be rehired for it at some future date and whether he suffered any injury, illness or other disability. If he makes no claim it may be safely assumed that any future allegations are probably made in error. At this time those physical defects and disturbances in health that are so commonly a cause of the age-in-industry problems may be found and remedial measures recommended. The worker's attention may be particularly directed to those conditions that interfere with his working capacity the correction of which will facilitate his securing employment. Those defects most prevalent are varicose veins, hernia, bad teeth, infected tonsils and poor eyesight.

Many workers do not know how to go about getting defects corrected and some guidance is necessary. Since such conditions are not industrial in origin they should be referred to the private physician. Of course, there frequently arises the problem of how to meet the expense involved. For this purpose a lay-off can often be changed to a leave of absence, and funds may be advanced by the employer or the employee's loan association to meet the situation. For those who are unable to avail themselves of such opportunities it may be possible for them to secure attention at public hospitals, clinics and dispensaries now widely found in this country.

To avoid possible controversy it might be well to have it distinctly understood that the correction of defects is not a part of the employment agreement but is undertaken by the worker for the improvement of his condition and at his own risk.

The man who is sufficiently interested in his own welfare to have his physical defects corrected at least has some of the qualifications that go to make up a good worker and is entitled to a chance to prove his worth. Certainly, the colored man afflicted with hernia and who not only underwent operation to have it corrected, but had the other side strengthened by operation at the same time to prevent a second hernia was well entitled to be rehired when he returned in a much improved physical condition.

The time when the orderly routine of the worker's life is disturbed by an interruption of employment is ideal for an inventory of his physical condition. His anatomic, physiologic or psychologic condition may be such that a complete change of occupation or invironment will be highly beneficial to him. Certainly, those workers with kidney disease, diabetes, hardening of the arteries or asthma and who have been in contact with industrial dusts, fumes and gases will enjoy better health and a longer life in an outdoor occupation preferably of the rural type. Many workers who are aware of their impaired health status will request an examination at this time and they not infrequently follow the suggestions made for the improvement of their condition.

The result of the final examination serves as a guide in recalling men. By placing those men who are physically handicapped in such jobs as they are able to perform there is less likelihood of serious injury to them, they are able to do their work without hampering that of others, and a more efficient and happier group of workers is built up. Consider the young man only 24 years old who suffered from a heart disorder and who was unable to keep up with those more able bodied. He not only slowed up the work of his group but brought about confusion due to his frequent absence; when rehired after a lay-off for a job suitable for his condition his absences not only diminished, but his physical condition improved and he became a worker of increased usefulness. Certainly a worker with hardening of the arteries of the legs and feet should not be put in a place where injuries to these parts may occur, for such injuries often prove quite serious to persons of this type. Occasionally the final examination reveals a man whose industrial usefulness has been diminishing over a number of years, he has been transferred from job to job and work has

even been made for him. Obviously such a man is not suitable for recall and if he has been a faithful worker this may be the time that he should be recommended for pension instead of laid-off. A pension under such circumstances is not injurious to the man's pride and is certainly a more fitting recognition of his faithfulness.

In the building and maintenance of a high standard of industrial health, for the avoidance of certain liabilities under the compensation acts, and as a general welfare measure it is becoming more essential that medical examinations be made of workers at the time employment is discontinued.

The Skin and Industry

BY JOHN GODWIN DOWNING, M. D.

ALTHOUGH approximately a third of our population has been engaged for many years in some form of industry, many of which impose definite hazards on the workers, only recently has the importance and frequency of industrial dermatitis been recognized.

The relationship between accidents and industry is well defined, and in such cases the responsibility rests directly upon the employer. It must be emphasized that the disability may be just as real, and the responsibility of the industry just as great, in lesions of the skin as in fractures.

In fact, while a man may break his leg and on recovery return to his work, in cases of pronounced injury to the skin it is rare that the worker can return to the industry which caused his dermatitis. Thus, shoe ironers and bookbinders, developing a dermatitis after 10 or 20 years of employment, may have to learn a new trade.

The neglect of industrial dermatitis has been due in part to the insidiousness of the lesion which is produced. Many times years of continual irritation may elapse before a dermatitis appears. The skin carcinomas of tar workers do not appear until 10 years after the workers have begun to handle tar, which may be long after they have left the industry.

A more important factor is inadequate knowledge of the etiology of industrial dermatoses. Recent contributions have formed an abundant literature so that the etiological agents are usually well understood. Even if they are not known, the recognition and treatment of the special diseases is possible.

In order that the physician may diagnose these cases correctly it is necessary that he have a knowledge of chemistry, of the essentials of public health and hygiene, and be able to conduct a thorough investigation of the particular industry. Close cooperation with the employers and engineers of the plant is essential; otherwise it is impossible for any physician to have a real appreciation of the intricate conditions which surround employees at their work.

It is because of this complexity that the highly specialized field of industrial dermatology has come to be recognized. The industrial dermatologist will find that he has certain advantages. He is able to study carefully the environment of the worker, an important matter exceedingly difficult to obtain accurately from private patients. He can practice preventive medicine to an extent that is impossible in other clinics.

The dermatologist's program should include frequent inspection of the factories for which he is the consultant, dissemination of the principles of prevention, and the diagnosis and treatment of cases which arise. The author has found that an excellent method of popularization of prevention is by lectures. For example, a recent lecture in one factory lowered the incidence of industrial dermatoses nearly 75%.

Each worker should be made to realize the dangers involved in his trade. The more dangerous materials in a factory should be handled by the more intelligent. Care of the environment and personal hygiene must be stressed. If possible the employee should be required to make frequent changes in the type of his work. Medical measures include the use of protective creams and of neutralizing rinsing solutions, such as the employment of an alkaline wash by workers with sulphuric acid.

Individual cases must be investigated especially with respect to the substances handled by the worker. Any history of previous skin afflictions must be obtained. The time of appearance of the present lesion especially with relation to holidays and return to work is important. The type of previous treatment, if any, should be learned.

The dermatologist must exclude internal diseases, especially syphilis, by his examination. To consider the case one of industrial dermatitis, he must eliminate all other types of skin lesions. More than one case of psoriasis has been erroneously ascribed to an industrial cause.

Once a presumptive diagnosis is made, its etiology should be determined, if possible, by the patch test. The technique of this test has been outlined by Sulzberger and Wise. Small pieces of linen or blotting paper are covered with the material to be tested, which must be in a concentration insufficient to produce reaction on normal skins. The patches are applied for 24 hours to the skin of the patient, and the reactions noted on removal, and at intervals for the ensuing two weeks. A positive test must resemble the original dermatitis to be of significance.

The dermatitis should then be classified, preferably on the basis of etiology. The author has suggested a

convenient method of classification in an earlier paper, which groups the irritants into the following classes:

(1) Mechanical or physical agents, i. e., abrasives, heat, cold, actinic rays, friction.

(2) Flowering plants and their products—resins, lacquers, wood dusts.

(3) Vital agencies:

(a) Bacteria, yeasts, molds.

(b) Animal kingdom members—mites, etc.

(4) Chemical agents:

(a) Inorganic compounds — acids, bases, salts.

(b) Hydrocarbons and crude coal tar products—oils, tar, pitch, etc.

(c) Other organic compounds.

A simple method is to classify the case as dermatitis, either acute or chronic, followed by the etiologic agent.

Treatment should be both prophylactic and curative. Protective measures, such as aprons, gloves, and free ventilation are important. The author has found that either of the following two creams, rubbed into the hands before working, form an excellent protective:

(1)	Mineral lard	3 lb.	
	Paraffin, molle	6 oz.	
	Cyllin	3 oz.	(Collis)
(2)	Gum arabic	4 lb.	
	Soap chips	19 lb.	
	Water	74 lb.	
	Hydrous wool fat	2 lb.	
	Oil of lemongrass	128 gm.	
	Acid red	to color	
	(General Electric Co., Cream No. 406)		

If a worker is exposed to a known irritant he should be subjected to daily inspection and removed on the appearance of the slightest eruption.

A general plan of treatment of a fully developed dermatitis that will give excellent results is to first employ wet dressings and then follow them with pastes. The choice of wet dressings will depend on what is necessary to neutralize the irritant and to soothe the affected skin. Any of the following washes is usually satisfactory.

(1)	Aluminum acetate	0.5%
	Water q. s.	
(2)	Zinc oxide	8 gm.
	Calamine	4 gm.
	Phenol	2 gm.
	Glycerin	4 cc.
	Aqua q. s. ad	250 cc.
(3)	Sodium bicarbonate	4 oz.
	Potassium chlorate	2 oz.
	Sodium borate	2 oz.
	Sig: Dissolve a tablespoonful in about two quarts of warm water and bathe the affected parts, bathing for about 15 minutes, keeping the solution as warm as can be endured. Do not rub.	
(4)	Potassium permanganate	0.1
	Aqua	500.

If the eruption is very moist use:

	Sol. alum. acet	30
	Acid boric	15
	Aqua	500

Later, as the skin shows less edema and oozing, pastes should be substituted, such as:

(1)	Zinc oxide	15.
	Starch	15.
	Vaseline	30.
(2)	Ichthyol	0.3
	Zinc oxide	4.
	Calamine	10.
	Petrolatum q. s.	30.

If the skin later requires softening, bland ointments may be employed.

(1)	Thymol iodide	0.6
	Olive oil	8.
	Lanolin	30.
(2)	Phenol	0.6
	Olive oil	4.
	Lanolin	30.

Some cases are distinguished by pruritis. They show considerable infiltration of the skin. The itching and the dermatitis are relieved by either of the following ointments:

(1)	Lenigallol	2.5
	Olive oil	2.5
	Lanolin	4.
	Vaseline	30.
(2)	Crude coal tar	2.
	Zinc oxide	2.
	Starch	15.
	Vaseline	15.

In marked cases which persist x-ray may be used. However, a word of caution is necessary. It should be employed in small amounts, for cases with recurrence who previously have had much x-ray therapy are very refractive to treatment.

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Injuries in the Auto Industry

By J. W. Hilbert, M.D.

The Studebaker Corporation

WORK in the automotive industry is of such a diversified nature that it would be impossible to make a blanket statement that any particular type of injury is peculiar to that industry. To be sure it would be safe to say that if injuries to the hands and injuries to the eyes could be avoided, 70% of the accidents occurring in the automobile industry would be

eliminated. If to this be added injuries to the feet, 85% of all accidents would be accounted for.

The question naturally arises as to why the bulk of accidents should involve the hands and feet, and this is answered by calling attention to the fact that most accidents in automotive plants occur in the course of the handling of materials. The better to understand just where the hazards are around an automobile plant, an analysis of accidents by divisions was made with the following interesting results:

Laceration to hand or arm	42.1 %
Eye injuries	23.5 %
Contusion to hand or arm	7.0 %
Burns	5.3 %
Splinters	5.3 %
Puncture wounds	3.0 %
Sprains	2.8 %
Contusion to leg or foot	2.72%
Laceration to head or face	2.2 %
Infection of hand or arm	1.5 %
Contusion miscellaneous	1.5 %
Laceration to leg or foot	1.0 %
Fractures	.8 %
Miscellaneous injuries	.8 %
Amputations	.2 %
Infection of leg or foot	.12%
Herniae	.12%
Infection of head or face	.04%

relieves the condition, and available containers are always on hand. The symptoms, in addition to cramps, are increase in temperature, pulse rate and blood pressure, increased sweating, hyperpnea, and vasomotor disturbance.

In the forge division one of the outstanding hazards is the handling of hot materials, not alone from burns sustained but also from sprains to arms, shoulders and backs from the continuous use of heavy tongs. High-pressure exhaust systems are largely responsible for eye injuries in this part of the industry, and employees must wear proper safety goggles to protect themselves from this hazard. Safety shoes and reinforced aprons are also required in the forge shop departments.

The stamping division is well prone to be a huge hazard unless the strictest safety regulations are enforced. To avoid loss of fingers and hands all equipment must be 100% at all times. Every employee must be thoroughly educated to practice safety both to himself and fellow workers and to use every possible safety device. The use of heavy reinforced gloves in the handling of large sheet metal material is essential to avoid serious lacerations about the hands.

In the wood mill division high-speed machinery causes most of the accidents. These not only can be numerous but also very serious. Careful application of safety appliances and common sense goes far in accident prevention here.

In the body plants lacquer almost entirely replaces lead paint, but in the operation known as putty sanding a fine lead dust is created which, to an individual predisposed, may give symptoms of lead poisoning. Any cases of persistent headache, dizziness, obstinate constipation, epigastric pains, visual disturbances, insomnia, periodic vomiting and loss of weight, working under suspicious conditions, are checked for anemia, eye ground changes, tremors, unsteady station, lead lines, wrist or ankle drop and convulsions, and, if conditions warrant, are immediately taken off of the work.

The power division, although not directly a part of

	Foundry	Forge	M & A	Stamping	Final Assembly	Wood Working	Body Division	Power Division	Transportation	Stores
Eye Injuries	34%	31%	24%	21%	12%	18%	33%	24%	22%	12%
Laceration to hand or arm	28%	16%	43%	49%	43%	41%	40%	23.4%	26%	43%
Burns	10%	12%	—	6%	—	—	—	—	—	—
Contusion to hand or arm	—	—	10%	7%	16%	—	9%	12.6%	12%	12%
Splinters	—	—	6%	—	—	11%	—	—	—	—

NOTE: These tables give the percentage of accidents for the various divisions in an automobile plant listing only those that make up the biggest percentage. It is readily seen, that hand, arm, and eye injuries outrank all others; that in the foundry, forge and power divisions eye injuries outnumber hand injuries, and that in the foundry and forge division burns make up a large percentage of the total number.

Accident Analysis—Average for a Five-Year Period

IT MIGHT be well to say a word about health hazards peculiar to, or prevalent in, the automotive industry. One of the outstanding problems is that of dust, especially in the foundry division. Proper ventilation, both from the standpoint of dust and temperature, is of prime importance. Exhaust systems, respirators and health education are all essential.

Heat cramps are encountered in the foundry and forge departments throughout the year, being quite prevalent during the summer months. The most important factors in the production of heat cramps are high temperatures and high humidities coupled with low air motion, or, in other words, factors which interfere with heat loss from the body. Inadequate sleep, alcohol, insufficient food and disease predispose to heat cramps. The administration of salt solution readily

the automobile industry, comes in for its share of consideration in view of its hazards. Electric shock, of course, is combated with artificial respiration and stimulation. Educational programs along safety lines are ever to be in force. Ringworm of the feet was encountered in the shower rooms of the power division a few years ago. This is apt to be the case in shower rooms anywhere in an industrial plant. To combat this condition three things are of outstanding importance: *first*, the disinfection of the shoes worn by the patient; *second*, the disinfection of floors of showers and hallway to showers; *third*, the education of the employee not to walk barefooted on the floors of shower baths in public places.

Carbon monoxide poisoning can be a very serious factor in our engineering laboratories where, if all precautions of good ventilation are not used, symptoms of carbon monoxide poisoning may be manifest.

Methyl alcohol used in the machining divisions as a wash bath in certain particular operations may give rise to symptoms of methyl alcohol poisoning, since it has been shown that it is at least as toxic through inhalation or skin absorption as it is following oral intake.

It is very evident, therefore, that the industrial physician to be of real value to his organization should not only be able competently to do the surgical work that arises but also should have a working knowledge of industrial hygiene.

Eye Injuries and the Use of Safety Goggles

By T. O. Anderson, M.D.

WHEREVER men labor with machinery or their hands, there is always present the danger of eye injury. These injuries may vary from a superficially imbedded foreign body or a slight burn of the eye to a foreign body which has penetrated the globe or a burn which destroys the cornea and surrounding tissues. Of the superficial injury, the consequences are not as a rule serious.

When a foreign body enters the globe of an eye the resultant destruction and disarrangement of anatomical structures by the foreign body, the organisms carried with it, blood-borne infection and efforts to remove the foreign body are sufficient to cause, in a large percentage of cases, a total loss of vision in the injured eye, and if the globe should be preserved it remains as a potential source of trouble.

In accidents caused by the splashing of molten metals, liquid caustics and acids where the destruction of the cornea is sufficient to destroy the substania propria, the resulting scar will usually cause complete loss of vision and also remain as a potential source of trouble.

Since the advent of safety goggles for use in various forms of industry the number of eye injuries has greatly decreased. Reports indicate that where the rule for wearing of goggles is mandatory the majority of serious eye injuries are preventable. The results of the operation of this rule are to be seen at the Pullman Company, where no serious eye accident has occurred for seven years.

In plants where goggles are worn without regard to rules, the following case illustrates how unexpectedly accidents happen. A man working in a chemical plant just at quitting time removed his goggles and secured a bucket with which to wash up. The bucket contained residue of caustic, and when he turned on the water, which was under pressure, some of the caustic splashed in his right eye, causing a necrosis of the cornea, conjunctiva and part of the sclera, necessitating enucleation.

The following taken from the annual report of the Bureau of Workmen's Compensation, Department of Labor and Industry, State of Pennsylvania, for the years 1916 to 1931, inclusive, indicates something of the cost of eye injuries:

Year	Eye Losses	Agreements and Awards	Compensation Incurred	Average Compensation Per Case
1916	366	357	$ 349,896	$ 980
1917	372	370	405,097	1,095
1918	706	683	840,430	1,230
1919	678	651	828,432	1,119
1920	691	664	972,510	1,465
1921	677	653	1,005,414	1,540
1922	550	527	807,791	1,533
1923	649	621	992,193	1,598
1924	658	637	1,008,898	1,584
1925	538	526	800,598	1,522
1926	575	556	870,732	1,566
1927	588	569	882,420	1,551
1928	518	491	865,173	1,762
1929	565	542	1,023,074	1,888
1930	488	468	889,015	1,900
1931	453	431	819,208	1,901
	9072	8746	$13,360,881	$1,528

Upon comparison of the costs of various forms of injury, it will be seen from the following that eye injuries head the list:

1916 to 1931 Inclusive	Agreements and Awards	Comp. Incurred	Aver. Comp. per Case
Eye losses 9072	8746	13,360,881	$1,528
Hand losses 3691	3600	7,142,658	1,984
Arm losses 1215	1200	2,876,278	2,397
Feet losses 2383	2304	4,197,372	1,822
Leg losses 1759	1687	4,154,032	2,462

The question sometimes arises as to when safety goggles should be worn. There are few forms of industry where eye accidents do not occur, and it is impossible to say when and how such accidents will hap-

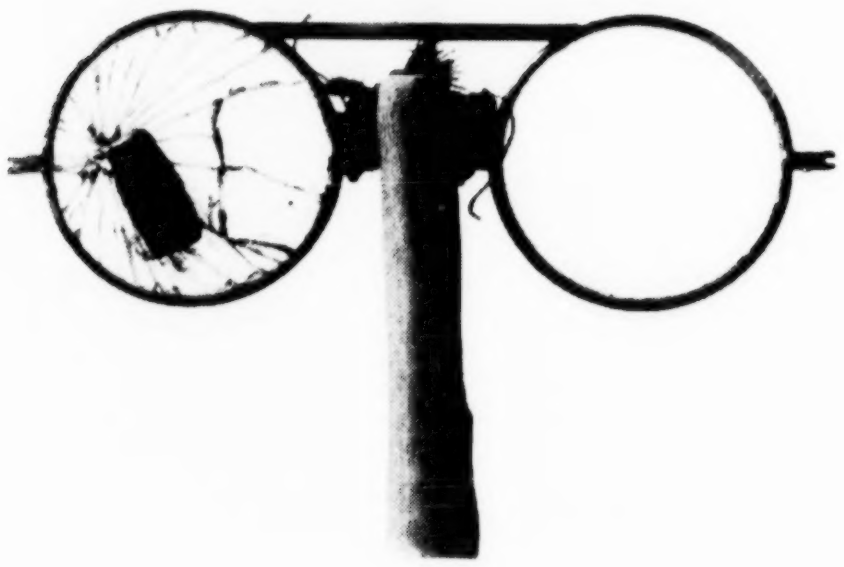
pen. The safest practice is to have goggles used *wherever there is any possibility of eye accident.*

The Head and Eye Code outlines the following groups of processes or operations on which eye protection should be used:

Group A—Processes where protection from relatively large flying objects is required.

Examples of these processes are chipping, calking, and some riveting operations.

NOTE: While goggles will furnish adequate protection in most instances against injury to the eyes by relatively large flying objects, they do not afford the



desired protection in some operations, such as cutting off rivets when constructing, repairing or dismantling railroad cars, etc. One prominent railroad car company uses a heavy wire mask similar to a baseball catcher's mask. The wire screen of the mask is made of strong heavy wire with small enough mesh to ward off flying rivets that may strike the screen.

Group B—Processes where protection from dust and small flying particles is required.

Examples of these processes are scaling and grinding of metals, stone dressing, and some woodworking operations.

Group C—Operations where protection from dust and wind is required.

Examples are automobile driving, locomotive driving and firing, and electric spot and butt welding, welding where there is no exposure to radiant energy.

Group D—Processes where protection from splashing metal is required.

Examples are babbitting, pouring of lead joints for cast iron pipes, casting of hot metal if there is a possibility that water is present, and dipping in hot metal baths.

Group E—Processes where protection from gases, fumes and liquids is required.

Examples are handling of acids and caustics, dipping in galvanizing tanks and some japanning operations.

Group F—Processes where protection from an excessive amount of dust and small flying particles is required.

An example of these processes is sand blasting.

NOTE: A suitable hood or proper ventilation are the only types of protection that should be permitted. Goggles are not suitable for this group of operations.

Group G—Operations where protection is required from reflected light or glare.

Examples are long exposure to snow covered ground, exposure to reflected sunlight from roofs, roadbeds, etc.

Group H—Processes where protection from injurious radiant energy with a moderate reduction in intensity of the visible radiant energy is required.

Examples are oxy-acetylene and oxy-hydrogen welding and cutting, open-hearth, bessemer and crucible steel making, furnace work, electric resistance welding, brazing, and testing of lamps, involving exposure to excessive brightness.

Group I—Processes where protection from injurious radiant energy with a large reduction of the visible radiant energy is required.

Examples are electric arc welding and cutting.

NOTE: Proper helmets or shields are the only types of protection that should be permitted for these operations. Goggles should not be used.

Observance of the following measures will overcome some of the principle objections to the use of góggles:

1. There is a correct type of goggle for the particular job; it should be used.
2. The frame should be fitted properly and be as comfortable as possible.
3. Corrected lenses should be used when necessary.
4. Sweat pads, anti-fogging compound (castile soap or glycerin pencil) and proper ventilation of goggles should be attended to.
5. Goggles should be kept clean and in good condition.

Sometimes it is difficult to get men to wear goggles or to wear them according to rules. This difficulty can be overcome by:

1. Education: (a) explanation of use; (b) posters with photos of broken goggles that have saved sight, with an account of the accident;
2. Strict observance of rules for wearing goggles by everybody concerned; and
3. Disciplinary action when necessary.

The average pair of goggles weighs an ounce and a half, and an ounce and a half of prevention of this kind is worth any amount of cure.

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Traumatic Surgery

—With Special Reference to Certain Principles of Treatment—

by

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FROM the mass of theories and methods of treatment of the commoner injuries I have culled a few main principles or points of view that appeal to me as important for success in this work. The outcome of a case is usually determined by the choice of treatment, so I will attempt to emphasize procedures that make for success and also mistakes that cripple. The points to be mentioned in this rather broad field are divided into first aid treatment, treatment of infections, of injured tendons, and of injured nerves.

FIRST AID: Consider first an example of a mistake that cripples. The patient comes with a badly lacerated limb with open fracture, open joint, exposed tendons and nerves and a defect in skin. The limb is placed in a fracture box and treated with compresses. This mistake results in osteomyelitis, infected joint, sloughing of tendons and nerves, and after a long illness much crippling and cicatricial tissue and flexion contracture.

The opportunity of the golden time has been overlooked. The golden time is in the first 12 hours or even 24 hours. This is before bacteria in the wound have had time to multiply, and only then is the chance so to act that long illness and crippling will be prevented. How? By debridement, changing open fractures to closed, setting fracture and immobilizing limb at once, closing over open joints, bones, nerves and tendons and even closing the wound itself.

A wound undebrided and left with a traumatized and dirty surface is destined to go through a stage of infection and sloughing which prolongs the time of disability and by the excess of infection jeopardizes the limb.

The wound should first be sterilized by 50% tincture of iodine. Then with curved, double-pointed, flat-bladed scissors absolutely all damaged and infected tissue is excised. The limb should be rendered bloodless by a tourniquet so the tissues can be seen intimately and so that infection will not be carried about by sponging. The whole surface of the wound marked plainly by the iodine is so completely excised that only clean, viable tissue is left. Overlooking one crumb of wound surface is enough to prevent primary union. Protruding bones are replaced after thinly chiseling off their surfaces. After a final flushing with the iodine the wound is closed without drainage and without buried sutures. The limb is then immobilized. A dry air dressing is excellent. Primary union follows in over 90%. It is true that we usually read in the report of a case that debridement was done and infection followed. This is due I fear to a misconception of what is really meant by debridement. It was reported that the wound was debrided, but how was it done? The success of debridement depends on the care and thoroughness of the technique.

Exposed bones, joints, nerves and tendons can be covered by swinging over them a flap of adjoining good skin, and the defect left by the flap can be covered at once by a Thiersch skin-graft. Similarly any raw area left by loss of skin can, after debridement, be covered by Thiersch skin-graft. Thus, by closing over vulnerable structures infection is prevented and a long siege of osteomyelitis, infected joint, sloughing nerve and tendon is avoided.

In this golden time of the first 24 hours, when it is still possible to remove the few bacteria that are present, there is opportunity for other advantages. Anesthesia by the local, block, brachial plexus or spinal methods, which is dangerous after infection is present, is available. Used routinely in wounds of extremities and in fractures in place of general anesthesia, our problem is simplified and dangers are lessened. Brachial plexus, block anesthesia, and local anesthesia work best in conjunction with a tourniquet. The limb is rendered ischemic by winding with an Esmarch bandage and at least one inch above this a blood pressure band is pumped to 300 and the tubes clamped. The inch space is essential as removal of the Esmarch would otherwise lower the pressure in the band. The quick prick of a hypodermic needle injecting 2% novocaine with adrenalin into the median, ulnar and radial nerves gives prompt and perfect anesthesia in hands.

Careful debridement together with plastic closure by skin flaps of all exposed vulnerable structures, closure of skin defects by Thiersch graft, and final immobilization of the limb by plaster of Paris cast, Crammer wire, etc., takes much more of the surgeon's time at the primary operation but saves time in the end as the daily dressing is eliminated and there is practically no after-treatment. Convalescence is easy and extensive cicatrization and crippling are minimized.

It is well when treating injuries to develop the habit of always searching for other and less evident injuries, lest they be overlooked.

Transfusion for shock and hemorrhage should be

mentioned to emphasize that when it is needed as small a quantity of blood as 500 cc. is insufficient to obtain results—900 cc. is our routine, and sometimes even 2000 cc. taken from several donors is needed to produce results.

INFECTIONS: In treating infections the first cardinal principle is to incise widely enough, that is, to make a surgical rather than a medical incision. An angle or turn in the line of incision gives a trap-door effect thus giving wide open, funnel-shaped drainage. Incisions should be dependent for gravity drainage.

The principle next in importance is immobilization of the infected part. This is done by splints or plaster of Paris.

Heat and moisture are also important, and also elevation to improve the circulation and lessen the edema.

If we furnish adequate drainage, immobilization, heat, moisture, and elevation, Nature will do the rest. Nature alone will do these, in that abscesses point, reflex inhibition immobilizes, heat and moisture form under crusts, and the animal lies down and holds up the infected limb. But the surgeon can help by doing them better.

Assuming that these five main principles are adhered to, two methods of further treatment are available and each is good. One is by using the principle of the septic tank, and the other by using constant surgical cleanliness by the compress method. The first method is exemplified by the Orr treatment of osteomyelitis which is surprisingly successful. Another similar method in use in Austria is to expose the wound to the air and place a basin under it to catch the drips. Stalactites and stalagmites of crusts are allowed to collect for three weeks at a time, but reinfection and trauma are avoided by omitting the daily dressings. Strangely enough the wounds heal well. Thus Nature has its methods, developed down through the evolutionary ages, that act well in this principle of the septic tank. In fact it has had well developed methods for healing most any injured part or kind of injury long in use even before the advent of mammals. The healing of fractures developed way back following the development of the first bones in the age of fishes, so the healing of our fractures and other parts has a long heritage behind it. I saw the rib of a prehistoric dinosaur or reptile that had been fractured and had healed with the same appearance as that of our own healed ribs. The evolution of Nature's healing is a large subject which is as yet unexplored and unwritten.

The other method by wet compresses also has its merits and I believe in the majority of cases is preferable. Here the products of inflammation are continually removed and cleanliness is the essential. There are some prevalent mistakes in using the compress treatment. The most common of which is failing to keep the wound and surrounding skin clean. Sodden debris, crusts and epithelium pile up on the skin as foul breeding grounds for bacteria and keep the wound dirty. The skin should be curetted down to live tissue which can protect itself. There seems to be no halfway ground between the septic tank method and the cleanliness method. I believe the customary compress is too small, and too dry, and too hot. Compresses should be large enough and wet enough to hold heat and furnish plenty of solvent to carry away the toxins of the wound. The word lukewarm should be substituted for hot compresses to avoid traumatizing the healing cells by heat. Antiseptics even as mild as magnesium sulphate also kill and lower vitality of surface cells and so prolong the healing. Boric acid and normal salt solution are good routine solutions and ¼% sodium citrate added to them prevents the lymph from clotting and clogging the drainage.

In accident insurance the largest expense from permanent disability is from crippled hands and this can be greatly reduced by proper treatment. Hand infections require careful diagnosis just as do infections within the adbomen. We should be familiar with the boundaries of the various spaces where pus collects, the definite pathways along which it travels, the diagnosis of each, the best surgical approaches and the means of preserving function.

All severe infections and especially of tendon sheaths or fascial spaces should be hospitalized and general anesthesia and a tourniquet should be used. Local or block anesthesia spreads infection, and to open a hand in a bloody field is as dangerous as trying to repair a watch in the dark. Esmarch winding would express infection into the circulation, so instead the arm is emptied of blood by elevation and by a bicycle pump the blood pressure band is blown up over systolic pressure quickly enough to prevent filling of the limb with blood.

Incisions should be chosen more carefully than is the custom, with a thorough knowledge of the anatomy of the paths of infection, the tiny but important nerves and the sheaths and spaces in the hand. Many hands are crippled by wrongly chosen incisions. Under perfect vision the pus pockets are followed to their remoteness and laid open. The sites of greatest damage to tendons by sloughing are under annular ligaments in fingers and wrist, as here the tissues are bound and cannot swell, become ischemic and finally necrotic. The incisions laying these bands open should be lateral and not median over the tendons.

The wounds are packed with gauze wrung dry in the iodine solution and four hourly changes of compresses are instituted. The packs are not touched for

four days and then are removed permanently. Thus painful bleeding, traumatized, reinfected wound surfaces are avoided and there will be built up around the wound a barrier zone of resistance.

In healing, the wrist should be kept in dorsiextension, the proximal finger joints in flexion and the thumb in opposition. As movements are encouraged the motion which is at first of small amplitude will then be in a functionating range and by its usefulness will perpetuate the exercise and so increase in extent.

Most bad infections of hands are from trivial injuries neglected or treated late or inadequately, as bad injuries are usually cared for at once. Common mistakes that cripple are to treat a tendon sheath or fascial space infection or a case of lymphangitis in an office, to delay in operating, to incise in a bloody field, to make incisions that are too short, and incisions in the wrong place so as to cut important nerves, to open the wrong spaces and to fail to drain the correct ones. Of all incisions in the digits, palm or wrist the pernicious median-longitudinal one is the most crippling and at the same time the most prevalent and cannot be too strongly condemned.

TENDONS: What should be done in a laceration where tendons have been severed? A rule which should not be broken is never to attempt to unite a severed tendon after 24 hours have elapsed from the injury, as this is usually followed by infection, long sloughing of tendons and considerable crippling. Also the reconstruction later will be much more difficult as the normal tissue and the tendon to be repaired will have changed to a cicatrix. Even if the wound is only 24 hours old if a smear from it shows bacteria or even an excess of pus cells tendon suture should not be attempted. The usual history of a hand seriously crippled from infection following severed tendons is that the tendons were sutured two or three days after the injury or that they were sutured even on the same day but without thorough debridement.

If debridement is carried out thoroughly as described above and within 12 or 24 hours tendons can be sutured. One usually obtains primary union and good success, but the technique must be thorough and atraumatic. Very good results can be expected after primary suturing of tendons above the wrist where the surrounding tissues are mobile and also in the palm or dorsum of the hand. Suture of a flexor tendon within a finger, however, is usually followed by limitation of movement, because in a finger adhesions are very binding in the narrow firm-walled channel. Also in a finger the sublimis and profundus tendons adhere to each other so that the middle finger joint only can be flexed but not the distal one. If only the sublimis tendon is severed it is best for this reason not to suture it.

The advantage of suturing tendons primarily is that the tendon sheath is still present, the muscle has not contracted and the gap between the tendon ends has not been filled with scar tissue. In cases coming for reconstruction I would much prefer that no attempt had been made to primarily unite the tendons. Such efforts even if not followed by infection usually leave in their wake too much scar tissue from too much trauma.

If one is sure of his technique, primary tendon suture may be attempted but as little as possible of trauma and suture material should be used. I use silk and dip it in bichloride solution to make it unpalatable to bacteria. Chromic catgut is safer in case infection follows, though it entails a greater amount of foreign body. It is advisable to use but one simple stitch, and often one can join an extensor tendon with a figure-of-eight dermal suture through the skin. Careful postoperative splinting with the tendon relaxed protects the union. For flexor tendons the wrist only should be flexed, for if the fingers are held in flexion adhesions of the tendons will hold them so. Splints may be removed for flexor tendons in three weeks and for extensor tendons in four.

Where tendons pull around a corner they are free on a mesotendon in a tendon sheath and where they pull in a straight line they are attached and surrounded throughout their length by loose fat called paratenon. If a tendon is severed in a sheath its ends become rounded over and remain unattached, but when severed in paratenon formation their behavior is very different. There grows from the tendon end a pseudopodium an inch or two in length. It grows mostly from the epitenon and the layer of paratenon fat surrounding the tendon. At first translucent and of a diameter larger than the tendon, it attaches to all tissues within its reach and later concentrates and contracts. This is only another example handed down through the ages of one of Nature's methods of repairing an injured structure. It is an effort of the tendon to reach out and become reattached to its other end or to some other mooring and so to regain its function. In a sheath the retraction is so great the effort would be useless unless infection is present in which case the tendon is held from retracting by granulations and a pseudopodium does grow out.

This behavior of tendons in reaching out, attaching and then contracting often leads to disadvantage. It results in flexion contractures and especially so after infections. Also it hinders the action of adjoining tendons, for if one of the four tendons of the flexor profundus muscle becomes attached the common profundus muscle will be held from contracting and so cannot fully flex the other fingers. Strain, pain, weakness and disability will result until the fastened tendon

is freed surgically. Similarly a profundus tendon attached to an amputation stump of a finger will have too short an amplitude of movement and so will limit flexion of the other fingers. We should not, therefore, leave free or unsatisfied tendon ends laying around unless in a sheath. They should be anchored slack or embedded in an adjoining tendon. In joining a large to a small tendon the part of the cross section of the large tendon end which is not in contact with the end of the small tendon is unsatisfied and will reach out a pseudopodium, attach to surrounding tissue and prevent function.

In late repairs of tendon the sheath will be found to be obliterated, the distal end of the tendon to be swollen and brittle, as it has degenerated from disuse, and the muscle to be retracted. Therefore, it is usually necessary in repairs after two months to resort to free tendon grafting and to supply a whole new part often even including paratenon in addition. This, however, is getting into reconstruction surgery.

NERVES: The frequency with which nerve lesions are overlooked suggests that we are inclined to commit the error of leaving the nervous system to specialists. This traumatic surgeons cannot do as trauma damages every tissue in a limb irrespective of the specialties. The surgeon treating injuries either early or late should include in his capabilities nerve and plastic surgery as well as orthopedics. We should know the nervous system in terms of motions, areas of anesthesia, cordal segments, muscles and joints. With this association of living anatomy, injuries to nerves will be self-evident. A few quick simple tests will readily determine the envolvement of nerves. Suspicion of nerve injury should be ever present in accident cases and especially in fractures. Also one should always be watchful that splint pressure does not paralyze by such as causing foot-drop from pressure on the external popliteal nerve or interrupting the function of the nerves of the arm.

First aid treatment of a severed nerve should probably routinely consist of merely joining the ends of the nerve together with one catgut stitch, and then waiting until well after the wound has healed to do a formal nerve suture. The reasoning for this is: The completeness of the regeneration of the nerve is in direct proportion to the accuracy of the union of the nerve ends. We know that the scar in skin left from a traumatic laceration which is followed by primary healing is always broader and more conspicuous than one from a clean surgical incision. The same applies to the deeper tissues including nerves after primary suture. Lacerated wounds are lined with traumatized tissue and contain bacteria and so heal with more cicatricial reaction than do clean surgical incisions.

The unfortunate patient whose nerve has been sutured primarily presents the following dilemma one year later. Only partial regeneration and partial return of function has occurred and he will never have the amount of return of function to which he is entitled. The scar in the skin is broad and so is that at the nerve repair. Both the patient and surgeon are at this late date reluctant to resever and resuture, so the patient goes through the rest of his life with poor function. If, however, one has mastered debridement and is sure of his technique the nerve ends in some cases where there has not been too much trauma may be sutured with advantage. The wound is converted into what is practically a clean surgical wound, and there is in addition the advantage that a nerve sutured immediately after being severed regenerates a little better than when sutured after degeneration of the distal portion has already taken place. The best rule, however, for routine general work is to unite the nerve with one catgut stitch and later, under clean surgical conditions, to repair it accurately.

From signs and symptoms alone it is impossible to ascertain if a nerve is severed or merely physiologically blocked. It is, therefore, better not to delay surgical exploration too long as the muscles are undergoing degeneration. When they have so far degenerated that they no longer give even the reaction of degeneration, which is after several years, function cannot be regained by nerve suture. Because of this progressive degeneration the sooner motor nerves are sutured the better. One, two or three years make considerable difference, but sensory nerves give good sensation even if sutured four years later. The later the suture of the motor nerve the less will be the restoration of function until if sutured after 10 years only a flicker of muscle action will return. If from the nature of the accident one is sure the nerve is cut operation should follow healing by one or two months. Four months should elapse after healing of infected wounds for fear of latent infection. If there are no signs of recovery four months after the injury it is best to operate rather than wait for uncertain spontaneous recovery.

Crutches

HAROLD DODD, in *The Post-Graduate Medical Journal* (July, 1932), says: "In leg injuries avoid the use of crutches. These stimulate a 'crutch' cripple mentally, causing some patients to behave as cripples and 'play up' for sympathy, directing their thoughts to compensation instead of recovery. Modified weight bearing by elbow or hand sticks is infinitely more preferable. Crutches are scarcely ever necessary and cannot be too heartily condemned for ordinary fractures."

Workmen's Compensation

—Analysis of the Laws of the States and Territories of the United States—

THE Congress of the United States enacted a law in 1908 providing limited compensation benefits to certain classes of Federal employees.

The first state law to become effective was that of Wisconsin in 1911, although other states had passed laws which did not become effective at once.

The Wisconsin statute became effective on May 3, 1911. Other state laws becoming effective that year were those of Nevada, New Jersey, California and Washington. Today such laws are operating in 44 states, four territories, and the District of Columbia, while Federal acts cover civil service employees and longshoremen and harbor workers. The four states not having workmen's compensation laws at this writing are Arkansas, Florida, Mississippi and South Carolina.

From the accompanying tabular comparison of major features included in the laws it is apparent that there is little uniformity. Minor provisions vary to a greater extent than do basic features; and in view of these, and especially the interpretations of 59 different administrative bodies, it is almost impossible to determine the elements of a typical or average act.

Private insurance companies may underwrite the compensation risk in all states except Nevada, North Dakota, Oregon, New Hampshire, Ohio, Washington and Wyoming. Self-insurance, so called, is required in New Hampshire, and is permitted in all other states except North Dakota, Oregon, Washington and Wyoming.

Twenty-four states make a minimum number of employees necessary in order to come under the provisions of the law. In Oklahoma, for example, an employer must have at least two persons regularly employed before the law applies to him. In Alabama this number is 16.

Waiting periods—between the date of the injury and the beginning of compensation payments—vary from two weeks in Iowa to no time at all in Oregon. Twenty-nine states provide that in the event a disability extends beyond a fixed length the waiting period is waived and payments begin as of the date of injury; this fixed length varying from eight weeks in Alaska to one week in North Dakota.

Death benefits range from $15,000 in North Dakota to $1,500 in the Philippine Islands. Ten states provide that the benefit be paid to the beneficiary until death or remarriage.

Benefits for permanent total disability are generally the same as, or greater than, death benefits. In Massachusetts, however, the total disability benefit is less than the death benefit. Nineteen states provide that benefits for permanent total disability be paid for the remainder of life.

Partial disability benefits range from a maximum of $7,500 in the District of Columbia to $1,500 in Wyoming. Ten states provide that benefits be paid during the entire period of disability—seven, however, establishing a maximum total.

Twenty-seven states limit the medical benefit period, Alaska restricting the period to one year, and Massachusetts, New Hampshire and Vermont limiting it to two weeks. Twenty-five states limit the amount of medical benefit—from a maximum of $800 in West Virginia to $100 in Alabama, Georgia, Iowa, Kansas, Kentucky, Maine, New Jersey, Oklahoma, Pennsylvania, Rhode Island, and Tennessee.

Change is characteristic of workmen's compensation legislation. Almost every session of the state legislatures witnesses the introduction of many proposed measures to change the existing law, and a large proportion of these are acted upon favorably.

Aside from increasing the coverage, extending the period and increasing the rate of benefits, the most significant changes have had to do with the inclusion of occupational diseases as compensable cases. (State laws concerning occupational diseases are to be treated in a subsequent article.)

THE effect of repeated changes in compensation laws is apparent only when their cumulative experiences are studied. As an example, the Ohio law is summarized below:

1911—Enacted; 1912—Became effective.

1914—Death benefit increased, permanent partial disabilities scheduled, maximum benefits for temporary total and temporary partial disabilities increased.

1917—Medical service maximum increased, permanent partial in addition to temporary total compensation payable.

1918—Death benefit increased.

1919—Temporary total rate of benefit increased; partial loss of eye considered as permanent partial.

1921—Permanent total benefit rate increased; temporary partial and permanent or partial rate increased; compensation for facial disfigurement established (at a maximum of $3,750); occupational disease law became effective.

State or Territory	Year Effective	Carriers	Exemptions	Waiting Period	Weeks of Disability Requiring Payment from Date of Injury	Maximum Benefits						Maximum Medical	
						Death		Permanent		Partial			
						Weeks	Amount	Weeks	Amount	Weeks	Amount	Period	Amount
Alabama	1920	E	15*	2 weeks	4	300	$5000	550	$5000	300	.....	60 days	$100
Alaska	1915	E	4*	1 week	8	.....	9000	.....	9000	.....	$7200	1 year	Unlimited[16]
Arizona	1912	C	2*	1 week	2	G	.....	Life	.....	H	.....	90 days[15]	Unlimited[16]
Arkansas	No law	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California	1911	C	.....	1 week	.....	.....	5000	Life	.....	240[14]	5000	Unlimited	Unlimited
Colorado	1915	C	3*	10 days	.....	312	4375	Life	.....	H	3640	4 months	500
Connecticut	1914	E	4*	1 week	4	312	.....	520	.....	520	.....	Unlimited	Unlimited
Delaware	1918	E	4*	1 week	4	285[11]	.....	475	4000	285	.....	30 days[15]	150[15]
District of Columbia	1928[1]	E	.....	1 week	7	G	7500	Life	7500	H	7500	Unlimited	Unlimited
Florida	No law	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	1921	E	9*	1 week	.....	300	5000	350	5000	300	.....	30 days[15]	100
Hawaii	1915	E	.....	1 week[5]	2	312	5000	312	5000	312	5000	Unlimited	Unlimited
Idaho	1918	C	.....	1 week[6]	7	400	.....	Life	.....	150	.....	Unlimited	Unlimited
Illinois	1912	E	.....	' veek[7]	4	.....	4000	Life	.....	416	.....	Unlimited	Unlimited
Indiana	1915	E	.....	week	.....	300	5000	500	5000	300	.....	30 days[15]	Unlimited
Iowa	1914	E	.....	2 weeks[8]	.....	300	.....	400	.....	225	.....	4 weeks	100[17]
Kansas	1912	E	4*	1 week	.....	.....	4000	416	.....	415	.....	60 days	100[15]
Kentucky	1916	E	2*	1 week	.....	335	4000	416	6000	335	4000	90 days[15]	100[15]
Louisiana	1915	E	.....	1 week	6	300	.....	400	.....	300	.....	Unlimited	250
Maine	1916	E	5*	1 week	.....	300	4000	500	6000	300	.....	30 days[15]	100[15]
Maryland	1914	C	.....	3 days	.....	416	5000	Life	5000	.....	3750	Unlimited	500
Massachusetts	1912	D	.....	1 week	4	500	6400	500	4500	H	4500	2 weeks[15]	Unlimited
Michigan	1912	C	.....	1 week	6	300	.....	500	9000	500	.....	90 days	Unlimited
Minnesota	1913	E	.....	1 week	4	G	7500	Life	10000	300	.....	Unlimited	Unlimited
Mississippi	No law	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	1926	E	10*	3 days	4	300	.....	Life[13]	.....	100	.....	60 days[15]	250
Montana	1915	C	.....	1 week[10]	3[10]	400	.....	500	.....	500	.....	6 months	500
Nebraska	1913	E	.....	1 week	6	350	.....	Life	.....	300	.....	Unlimited	Unlimited
Nevada	1911	A	.....	1 week	1	G	.....	Life	.....	260	.....	6 months[15]	Unlimited[16]
New Hampshire	1912	F	4*	1 week	1	.....	4500	300	.....	300	.....	14 days	Unlimited
New Jersey	1911	E	.....	1 week	7	300[12]	.....	400	.....	500	.....	Unlimited	100[15]
New Mexico	1917	E	3*	1 week	.....	300	.....	500	.....	150	.....	Unlimited	350
New York	1914	C	3*[4]	1 week	7	G	.....	Life	.....	H	4000	Unlimited	Unlimited
North Carolina	1929	E	4*	1 week	4	350	6000	400	6000	300	6000	10 weeks[15]	Unlimited
North Dakota	1919	A	.....	1 week	1	G	15000	Life	15000	H	4680	Unlimited	Unlimited
Ohio	1912	B[2]	2*	1 week	.....	416	6500	Life	.....	H	3750	Unlimited	200[15]
Oklahoma	1915	E	1*	5 days	.....	.....	.....	500	.....	300	.....	60 days[15]	100[15]
Oregon	1914	A	.....	None	.....	G	.....	Life	.....	104	.....	Unlimited	250[15]
Pennsylvania	1916	C	.....	1 week	.....	300[12]	.....	500	6500	300	.....	30 days	100[15]
Philippine Islands	1928	E	.....	1 week	.....	208	1500	208	1500	208	1500	Unlimited	Unlimited
Porto Rico	1916	C	.....	1 week	.....	.....	3000	.....	3000	.....	2000	Unlimited	Unlimited
Rhode Island	1912	E	5*	1 week	4	300	.....	500	5000	300	.....	8 weeks	100
South Carolina	No law	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	1917	E	.....	None[9]	.....	.....	3000	Life	3000	312	.....	12 weeks	200
Tennessee	1919	C[3]	4*	1 week	6	400	.....	550	5000	300	.....	30 days	100
Texas	1913	D	2*	1 week	4	360	.....	401	.....	300	.....	4 weeks[15]	Unlimited
Utah	1917	C	2*	3 days	.....	312	5000	Life	.....	312	5000	Unlimited	500[15]
Vermont	1915	E	10*	1 week	.....	260	3500	260	4000	260	.....	2 weeks	150[18]
Virginia	1919	E	10*	1 week	6	300	5000	500	5600	300	5600	60 days[19]	Unlimited
Washington	1911	A	.....	3 days	.....	G	.....	Life	.....	.....	3000	Unlimited	Unlimited[16]
West Virginia	1913	B[2]	.....	1 week	.....	G	.....	Life	.....	340	.....	Unlimited	800
Wisconsin	1911	E	2*	3 days	3	.....	5600	1000	.....	H	.....	90 days[15]	Unlimited
Wyoming	1915	A	.....	1 week	3	.....	5600	.....	8000	.....	1500	Unlimited	300
U. S. Civil Service	1908	None	.....	3 days	.....	G	.....	Life	.....	H	.....	Unlimited	Unlimited
U. S. Longshoremen	1927	E	.....	1 week	7	G	7500	Life	7500	H	7500	Unlimited	Unlimited

NOTE

*—Laws do not apply to employers with this number or fewer employees.
A—Exclusive state fund.
B—State fund or self insurer.
C—Competitive state fund.
D—Private companies only.
E—Choice.
F—Self insurer only.
G—Until beneficiary's death or remarriage.
H—During entire period of disability.

[1] Public employees covered by act of 1919.
[2] Self-insurers must give bond or furnish proof of solvency.
[3] State fund for coal mining only.
[4] Applies to non-hazardous employment only.
[5] From first day in case of partial disability, adjudicated, after two weeks.
[6] One-third of waiting period absorbed in each of fifth, sixth, and seventh weeks of disability.
[7] Waiting period waived if disability lasts more than 30 days.
[8] From date of injury in cases of permanent partial; others as in (6).
[9] By interpretation.
[10] Doubled in case of non-resident beneficiary.
[11] To orphans.
[12] To minor dependents.
[13] 25% of earnings after 300 weeks.
[14] For life if disability is 70% or more.
[15] May be exceeded in certain cases.
[16] Employees contribute.
[17] Double in exceptional cases.
[18] For hospital, otherwise $50; 30 days allowed.
[19] In certain cases may be extended to not more than 180 days.

1924—Death benefit increased; all disability benefit rates increased; additional award in cases of violation of safety requirements.

1925—State department of Safety & Hygiene established.

1931—Maximum benefit for temporary partial increased; benefit for specific permanent partial increased; funeral expense benefit increased; other occupational diseases added.

THIS brief summary includes major changes only. But those are sufficient to indicate the trend of legislation. What such changes do to cost is reflected in the losses experienced under the act. Since Ohio operates a monopolistic state fund, the loss experience of that fund is sufficiently inclusive to indicate the total cost of changes.

During the first three years the law was in force the average annual losses incurred amounted to $1,185,814. In the three-year period preceding the 1931 revisions the average annual losses incurred amounted to $14,472,079, an increase of 1220%.

That Ohio experience is indicative of the experience of other states is shown by an analysis of the changes in compensation laws brought about in the legislative sessions of 1931. In that year the laws were changed in 33 states and three territories. A brief summary of these changes follows:

Alabama—Double compensation for minors illegally employed.

California—Failure to give an employer 30 days' notice of an injury no longer a bar to recovery; eight other changes.

Colorado—Sheriffs, deputies, and possemen brought under the act; a grandchild now considered an actual dependent; three other changes.

Connecticut—Information obtained by state health department in investigating occupational diseases cannot be used as evidence in action at law or under compensation act; two other changes.

Delaware—Waiting period reduced; medical benefits increased; coverage enlarged; salaries increased; two other changes.

Georgia—Industrial commission abolished, its duties transferred to new department of industrial relations.

Hawaii—Two minor changes.

Idaho—Periods of compensation for specified injuries extended; powers of industrial board increased; four other changes.

Illinois—Schedule of death benefits increased. Department of Labor and Industrial Commission authorized to investigate subject of occupational diseases. Five other changes.

Iowa—Two minor changes.

Kansas—Medical benefit limit raised; two other changes.

Maine—Five minor changes.

Maryland—Schedule of benefits for permanent total, temporary total and temporary partial disabilities increased; authority of industrial commission enlarged; assessments for administrative expense increased; six other changes.

Massachusetts—Two minor changes.

Michigan—Coverage enlarged.

Minnesota—Minor change only.

Missouri—Schedule of medical benefits increased, both period and amount; coverage for occupational disease provided for; two other changes.

Montana—Coverage enlarged; medical benefits increased; two other changes.

Nevada—Certain death benefits increased; two other changes.

New Hampshire—Death benefits increased; maximum medical and burial expense benefits increased.

New Jersey—Five days established as minimum week for purposes of compensation; coverage enlarged; appeal procedure changed; 10 other changes.

New York—Coverage enlarged; 12-month time limit between contraction of occupational disease and disablement not to apply in certain cases; five other changes.

North Carolina—Disfigurement provision enlarged; second-injury fund established; power of commission extended; employer required to pay medical expenses instead of state; rating and inspection bureau and division of workmen's compensation created; nine other changes.

North Dakota—Penalties increased; five other changes.

Ohio—Coverage enlarged; additional occupational diseases listed; maximum compensation for partial disabilities and specific injuries increased; funeral benefits increased; penalties added and increased; eight other changes.

Oklahoma—Salaries increased; one other change.

Oregon—Coverage enlarged.

Pennsylvania—Double compensation for injuries to children illegally employed; two other changes.

Philippine Islands—Coverage enlarged; benefits for certain injuries increased; two other changes.

Porto Rico—Penalties increased; tax on insurance companies for expense of industrial commission increased; nine other changes.

South Dakota—Coverage enlarged; one other change.

Texas—Penalties increased; funeral benefits increased; 10 other changes.

Vermont—Minor change only.

Washington—Three changes.

Wisconsin—Waiting period reduced; compensation for permanent disability to a person under 30 years of age to be based on probable wages as of age 27; partial disability benefits increased; certain death benefits increased; seven other changes.

Wyoming—Coverage enlarged; benefits for permanent partial disabilities increased; certain death benefits changed; three other changes.

Medical Service of The Bell Telephone Company of Canada

BY A. R. PENNOYER, M.D., C.M.
Medical Adviser
The Bell Telephone Company of Canada

FIFTEEN years ago, we, in The Bell Telephone Company of Canada, inaugurated what we call our plan to cover medical services, sickness disability, benefits, pensions, death benefits, etc., and this plan, with modifications that appeared advisable from time to time, is the one that governs our medical and allied activities at the present time.

As to the conditions which probably induced this company to undertake medical work, I can imagine that the executives, spurred by their watchword, "Service to the Public," and confronted with an ever increasing demand for such service, realized the importance of the healthy mind in the healthy body, and the need for a high morale, so that service might be continuously rendered day and night, Sundays and holidays throughout the year, regardless of storms, and stresses, and operating difficulties of all kinds; and so they came to see in a medical and allied service a means to help build and maintain the high standards in the employee body that were necessary for such an accomplishment.

No doubt, too, although they were already doing something in the way of looking after sickness and providing pensions, it was found desirable that uniformity be established, so that all employees would be treated alike.

When thinking of our medical work we are in the habit of linking up other activities, which, while not definitely in the medical department, are closely related to it and receive advisory help from it. I refer to such work as:

First—First Aid. Here we are affiliated as a center with the St. John's Ambulance Association, and give courses of instruction throughout the year. We have at present 4,500 fully qualified and certificated first aiders. This work has given a great deal of satisfaction, and is considered eminently worth while. It has been our pleasing experience that this valuable first aid has not been confined to our own people, but that very frequently our trained men have been able to render valuable, and often life-saving, service to the public with whom their work has brought them in contact.

Second—Accident Prevention Work. In this there is a continuous campaign, which has yielded remarkable results, reducing accidents in an almost unbelievable way.

Third—Health Course to Women. This covers elementary anatomy, physiology and hygiene, and leads to a certificate of proficiency. We are well pleased with the outcome of this endeavor.

Our plan covering pensions, disability benefits and death benefits is carried out under the direction of a committee made up of important officials of the company. Employees make no payment towards this plan, nor for any other medical service rendered by the company. We do not treat our people for sickness; except for minor and emergency conditions referred too late; they select their own doctors, and pay for their own medical care.

The plan provides for the payment of wages during sickness on an increasing, graduating scale from two to 10 years' service, beginning with four weeks full pay and nine weeks half pay, and increasing to a maximum of 13 weeks full pay and 39 weeks half pay.

The medical department reports to the senior vice-president, and it is under his general supervision that the work is carried out.

Pensions are granted on a basis of age and length of service.

Death benefits are also based on length of service, and are applicable when there is a dependent beneficiary.

Our medical establishment comprises:

A medical adviser—a part-time salaried employee, who is at the head of the medical service throughout the system;

A medical examiner in Montreal—a part-time salaried employee;

A medical examiner in Toronto—a part-time salaried employee;

Two full-time nurses—we have several other nurses in the company, but these are traffic employees, and are engaged mostly in welfare work; they do, however, make many helpful reports to the medical department;

Three accident surgeons in Montreal—paid on the basis of the work they do; and

Three accident surgeons in Toronto—paid on the basis of the work they do.

At other points in the company's territory, we have 120 doctors, regularly appointed to act both as accident surgeons and medical examiners, and, likewise, paid on the basis of the work they are called upon to do.

We have mutually agreeable arrangements with outstanding specialists in various departments, e.g. x-ray,

biochemistry, ophthalmology, laryngology, chest conditions, etc., these people doing indicated work for us, with the expense borne either by the employee or the company at the discretion of the company's medical adviser.

This, then is our medical machinery, and with it we undertake to do the following work:

First—We maintain a general supervision of sanitary matters throughout our buildings.

Second—We supervise and direct the setting up of our construction camps throughout the territory, and in this connection, I would like to seize the opportunity to pay tribute to the Provincial Boards of Health—both in Quebec and Ontario—for the very efficient, courteous and prompt help they have given us whenever called upon to do so.

Third—We give advice to all departments of the company—particularly the legal and personnel departments—upon matters having a medical aspect, and arising either within the company or through contact with the public.

Fourth—We examine all applicants for positions, and classify them under four heads:

(a) Those physically suited for the position desired. To this group we are often able to give helpful advice with regard to health and habits.

(b) Those physically unsuited for the position desired but who may be placed in some other kind of work. For such people I feel that our efforts in suitably placing them have much to do with their future success, and in this connection I believe we make a distinct contribution to public welfare.

(c) Those people who are physically fitted for the work indicated but who need to have some necessary surgical, or medical interference, to correct unsound conditions that have been uncovered by the examination: Teeth often need attention; tonsils must be surgically dealt with; certain kinds of skin eruptions must be cured; infectious diseases need attention; sometimes primary or secondary lues calls for consideration; hernia is a problem; and suspicious conditions in the chest must be further investigated, etc., etc. There can be no doubt that in this group, we do a great deal to promote public health.

(d) Those not physically suited for any position. Our experience over a number of years has taught us that under this head we have comparatively very few cases, so that all in all, I think, the pre-employment examination works very little hardship to the general population, and leaves only a small residue of substandard unemployable people, who, I believe, will sooner or later have to be looked after by the state.

Fifth—We do all our own accident work and carry every case to a conclusion, either by our own surgeons, or by special consultants called in by us.

Sixth—We study all medical forms sent in by employees' attending physicians, and endeavor to cooperate with the latter, where further special examinations seem indicated, always observing ethical considerations in such matters.

Seventh—We make many physical examinations in ambulatory cases under the care of outside physicians, in the hope that, from our records of past illnesses and the possibility of more intimate knowledge of the conditions under which such an individual is employed, we may be able to assist the attending doctors, either through our knowledge, or by providing special examinations, such as x-rays, blood examinations, special chest examinations, etc., but no such work is undertaken without conferring with the employee's doctor, and carefully observing all ethical considerations.

Eighth—At area headquarters in Montreal and Toronto we have medical units, where we offer our people a service that, up to the present, we have not been able to give in smaller cities and towns. At both of these points any employee, by permission of his or her supervisor, may apply for a medical examination and for advice. This privilege is being increasingly made use of, and, I believe, is valuable to both the company and the employee body.

Ninth—We give a service for minor medical and surgical conditions in the cases of those not disabled enough to stop work. Such cases are not long continued unless the doctor is thoroughly certain of the minor nature of the trouble, whether it be either surgical or medical. When there is any doubt on this point, these cases are referred to the employee's own doctor.

It is my belief that no industrial or commercial organization is justified in maintaining a medical service that is not financially profitable.

A well-designed and well-conducted medical service is a profitable venture for any company with 1,500 employees or over.

A fairly extensive experience has convinced me that such a service can be maintained without conflict with private practitioners, if reasonable ethics are practiced.

When a medical service is carried on along the lines indicated herein, I believe it cannot fail to be conducive to public welfare.

Filing Case Histories

ONE of the most perplexing administrative problems of the industrial physician is that of recording and filing case histories. In most instances the difficulty arises out of the very mass of records, requiring the development of a filing system which will permit ready access to the complete history of the individual, from the initial pre-employment examination to the present case, including all data

pertaining to injuries and illnesses, whether treated in the plant or in an external agency.

A simple, yet most practical, method of maintaining medical records is by way of the master envelope. The one from which the accompanying form is reproduced is in use in a shop employing about 2,000 persons.

HOSPITAL DEPT.

Clock No.....

Name..... Age.....
Address .....
Married. ..... Single..... Children.....
Dept..... No..... Date.....
.....
Gen. Appearance.....
Eyes: R..... Pupil..... ac.....
L..... Ref..... L. T.....
Ears: Hears Watch R..... Inches.....
L..... Inches.....
Nose .....
Throat .....
Tongue .....
Teeth .....
.....
Neck .....
Chest Contour.....
Heart .....
.....
Pulse..... Hemoglobin.....
Blood Pressure.....
Lungs .....
.....
Abdomen .....
Extrem. (Upper .....
——— (Lower .....
Ing. Reg.....
.....
G. U.....
Urine Spec. grav.....Reaction.....
Albumin .....Sugar.....
Spine .....
.....
Skin .....
.....
Height..... Weight.....
Vaccination .....
Joints .....
NOTES: .....
.....

Hospital Department Envelope Form

The envelope proper is 6 in. *x* 9 in. with the form printed on the face for recording the results of the initial examination. All subsequent medical history is noted on forms of a size which will permit ready insertion and withdrawal. In use, the physician has to refer to only one place for a complete record of any individual, and the problem of clearing the active files of leaving or transferred men is thus greatly simplified.

A Medical-Aid Contract

FOLLOWING is the contract used by the Washington Hospital Association in its plan "to apply the principle of insurance to the modern problem of maintaining health, expressed in the motto: 'A large number paying a small amount to guarantee complete medical care for those who require it.' "

THIS AGREEMENT, entered into between Washington Hospital Assn., party of the first part, and Eagle Brass Foundry Company, party of the second part, for a period of one year and until cancelled by either party upon 60 days' written notice, from the first day of May, 1928,

WITNESSETH: The party of the first part, in consideration of the payments by the party of the second part of the sum of money herein mentioned, hereby agrees to furnish, perform and render to such employees of the second party who have signed the application, the following medical services:

General agreements: Party of the first part agrees to at all times maintain a staff of at least a major surgeon, physician, eye, ear, nose and throat specialist and a dentist, together with an x-ray, physiotherapy and laboratory departments, and a 24-hour telephone service. Any employee of the second party living outside of the territory of Seattle shall be included and receive the following benefits if they bring themselves, at their own expense, to Seattle for treatment. Seattle territory is to include all territory within city limits.

Hospital service: Care in a general ward bed of any Seattle hospital for any single definite and determined case as long as necessary, but not to exceed three months, for such diseases as are ordinarily accepted by the management of aforesaid hospitals, the patient to have his choice of any first class hospital. Provided, always, that the patient may have a private room if he or she so desires, by paying the amount of the cost of a private room over and above the usual charge for general ward assignment. Ambulance service in necessary cases will be furnished. Hospital service or any materials, or cash expenditures, not included in event of general epidemic, or in cases clearly originating before contract becomes effective. Operating room laboratory work, plaster casts, x-ray, and all drugs and medicines will be furnished while in the hospital.

Sickness: Treatment of diseases not exempted below will be included in contract. Home calls will be made when necessary.

Surgical services: All surgical services for operations or injuries not provided for under State Industrial.

Consultation: That in case a member patient desires the advice and consultation of another physician, the party of the first part will agree to, and pay for, such consultation, but said first party will not pay for the services of any other physician or surgeon, beyond herein agreed upon. The clinic to call the physician designated.

Additional services: All medicines, drugs, prescriptions at authorized drug stores, crutches, braces, surgical belts, dressings, plaster casts and splints will be furnished. All necessary laboratory work, x-rays, and all examinations for glasses will be furnished. Insulin will be furnished at cost.

Dental services: Dental x-ray and extractions will be furnished.

A complete physical examination will be given to each member who has signed the attached petition upon his or her request.

Exceptions: Venereal diseases, conditions relative to pregnancy and childbirth, results of alcoholism, drug addiction, and cases where the consensus of opinion of the medical profession is that no appreciable benefit would or could be derived from further treatment. *However, these exceptions will be treated at minimum fees.* In no event will the party of the first part pay for the services of any physician or surgeon, other than those designated by the said party of the first part, nor be liable for or pay for any services, bills or expense, unless authorized by the party of the first part. All responsibility under this contract ceases in the event of an unauthorized physician being retained, other than for first aid care. A definite record of attempt to secure one of our physicians is required in all such cases.

Payments: That the said party of the second part shall collect from each of its members who have signed the attached petition, or such employees who at a later date desire the services herein mentioned, the sum of $1 per calendar month, and shall remit the same to Frank G. Porter, representative of the party of the first part. In the event of the percentage falling below 75%, the party of the first part reserves the right to cancel contract.

It is further agreed that employees of the second party at the time of execution of this contract and petition who do not execute the same, shall before receiving the benefit of the medical service under this contract, submit to a physical examination by the party of the first part; said examination to be done without cost.

Those persons who may be appointed to a regular substitute or permanent position shall have 30 days after the date of permanent appointment to become a party to this agreement without submitting to a physical examination, and shall receive full benefits hereunder upon notification to the party of the first part of their intention to become a party hereto by the proper official of said corporation, and the payment of dues.

Any member who desires to continue this service after leaving present employ may do so by paying a full year's individual dues of $18.

It is further agreed and understood that should any employee desire to discontinue this service, party of the second part shall not be held liable for any further collection of dues for those who discontinue this service.

ENDORSEMENT: In witness whereof we have hereunto subscribed our names this . . . . . day of, etc.

Back to First Principles

AMENDMENT of the workmen's compensation laws so as to reduce the benefits authorized to the scope originally contemplated when the laws were passed, is urged by F. Robertson Jones, general manager of the Association of Casualty and Surety Executives. Mr. Jones contends that such amendment is necessary in order to counteract a crisis now facing the casualty insurance companies with reference to their workmen's compensation insurance experience. He insists that the line, because of the unwarranted liberality of politicians in broadening the scope of the compensation laws, and administrative boards in construing the provisions of the laws, has become virtually uninsurable. "In my opinion, industry cannot long stand the increasingly heavy burdens placed on it by the liberalization and enlargement of the coverages and benefits of the compensation system as it now exists in most of the states. On the other hand, insurance companies cannot long stand the drain of their resources caused by the failure of premium rates to keep pace with losses and the inability to charge and collect sufficient sums to pay the ever-increasing benefits, awards and necessary expenses."

In general, the chief remedy is to revert to the principles of the earlier compensation laws, possibly in line with the following suggestions:

1. Compensation should be restricted to cover only injuries caused by accidents, plus "occupational diseases" defined and subject to special conditions.
2. "Accident" should be defined to include only a sudden occurrence.
3. "Injury by accident" should be defined to exclude mental or nervous injuries due to fright or excitement only.
4. Where an accident aggravates a pre-existing disease, only the aggravation due to the accident should be compensated.
5. Waivers of compensation for the consequences of pre-existing defects or deformities should be permitted.
6. The doctrine of "added risks" should be written out of the law.
7. Compensation for death should be limited to cases where death results from the accident within one year or follows continuous disability and results from the accident within five years.
8. Compensation should be based on the probable loss of earnings from the injury.
9. Compensation for permanent injury, total or partial, should run for life only.
10. In fatal cases, the right of compensation should depend upon the status of the persons claiming dependency as of the date of the accident; and the compensation should be less for partial dependency than for total dependency, and less for a condition of temporary dependency than for a condition of permanent dependency.
11. The many false presumptions in favor of claimants, established by statute or practice under some compensation laws should be abrogated.
12. All findings of facts by accident commissions should be subject to review by the courts.
13. Notice of accidents as soon as practicable should be strictly required.
14. Compromise of really doubtful claims and final settlements in neurasthenic cases should be permitted.
15. The power of accident commissions to reopen closed cases should be limited.

Silicosis

—In Certain of Its Legal Aspects—

by

ANDREW J. FARRELL

WHO *was born November 15, 1895, at Aspen, Colo., graduated from Wendell Phillips High School, Chicago, in 1914, and from Northwestern University Law School in June, 1920; for seven years was in the legal department of the Hartford Accident & Indemnity Company; on March 1, 1928, took charge of the claim and legal department of the Central West Casualty Company, Chicago, and since then has been engaged in trying personal injury and workmen's compensation cases in Chicago and the midwest, mostly for the defense—in intimate contact with the matters and things whereof he writes.*

AT THE present time there are hundreds of suits against industrial concerns throughout the country, predicated on silicosis. In the State of Illinois approximately 200 silicosis cases are pending in the common law courts. Because of the unemployment situation and the activity of ambulance chasers there probably will be many more, with the resultant closing of industrial plants and a vast economic loss. A few facts with reference to the "chasing" of silicosis cases may be noted.

SILICOSIS suits are divided into two classes according to the different state laws. The first class are under the workmen's compensation acts of several states—California, Connecticut, Massachusetts, North Dakota, Wisconsin and the District of Columbia. The second will be referred to as common law cases, the right to sue being created either by common law or a statute. In those states where silicosis and kindred sicknesses are controlled by the workmen's compensation act there is not so much activity in stirring up claims, as the amount to be recovered is limited by the statutes. Under practically all workmen's compensation acts the payments are made in weekly instalments, and the rights of the claimant are still subservient to the powers of the industrial commission, even after trial. In other words, if an award is erroneous as to the extent of disability, the respondents or defendants can file petitions to have the same corrected by offering additional evidence and proof of the physical condition of the claimant. In the common law courts, however, there is no limitation as to the amount to be recovered except in a few states where there is a statutory limit on recoveries for death. The judgment in a lump sum is final after the defendant has appealed to the court of last resort, and it is usually paid in a lump sum. After the judgment becomes final it is impossible in practically all jurisdictions to change it as to amount, even though newly discovered evidence indicates that the condition of the plaintiff was exaggerated at the trial. As the fees of ambulance chasers range from one-third to one-half of the sums recovered, it can readily be seen that it is a racket which appeals to chasers, unscrupulous lawyers and doctors who put the dollar ahead of the ethics of their profession.

In various industrial centers the chief ambulance chaser has a representative. The latter might be a local storekeeper or a small business man who has connections with the workers in the various plants. The steady, consistent worker is not ordinarily prey for the chaser; it is usually the worker who has been discharged for inefficiency who is ready to sign a contract because he, in his own mind, is going to be benefited in at least two ways. First, his enmity towards his superior is appeased. Second, there is an opportunity to make a little easy money without working for it. Usually when a case of this nature is tried it is necessary for the plaintiff to produce as witnesses fellow employees to prove the conditions in the plant or factory. If the litigation is successful, the witnesses become plaintiffs in their own rights and the others act as their witnesses, and so it goes.

Ordinarily when a worker or former worker steps into the headquarters to sign up, he is informed that they cannot tell whether he has silicosis or not but they are willing to defray his expenses to an adjoining city where there is a special silicosis "clinic." The train fare is advanced and the subject leaves for the "clinic" where he is greeted by an "eminent" specialist. His history is recorded, a clinical examination is made, x-rays are taken of his chest, and after much deliberation he is called into the office of the specialist and informed that he has silicosis either in the ante-primary, the primary, or the secondary stage, but that he should not be overly alarmed. The contract is signed

shortly thereafter. The supposed "clinic" is operated by a doctor who specializes in testifying in court as an expert on almost any phase of medicine or surgery. A night with the authorities on any particular phase of medicine or surgery is enough to provide sufficient ideas for such gentlemen to qualify. After the contract is signed the man goes back home and awaits developments. He goes back, however, with all the symptoms of silicosis, skillfully made a part of him by suggestions on the part of the doctor. In many states it is possible to start what is known as a "poor person's" suit, without the payment of a filing fee. This is accomplished by the execution of an affidavit of poverty by the plaintiff. The doctor will take a gamble on the judgment to be obtained, for his fee. Hence the only expenditure is for railroad fare, and that is advanced.

The activities of the ambulance chasers in these cases would fill a book, but further comment on the details will only serve to divert from the theme. In leaving this subject it might be mentioned that there is considerable activity in some of the coal fields in various parts of the country at this time, and if something is not done to control this situation by legislation, the ramifications of this new "racket" will be far-reaching, and another load on our already taxed and overburdened industries.

THERE is rarely a defense in a court of law to a well prepared silicosis case regardless of whether the plaintiff has silicosis or not. This statement may be astounding to the reader, but a little explanation will be conclusive of its truth. It is always a question of fact for a jury as to whether or not the plaintiff has silicosis and whether or not it resulted from conditions in the plant or factory in which he was working. Where does the jury get the facts? From the witnesses. And where do the witnesses come from? The plaintiff produces witnesses to prove his contentions and theories and the defendant produces witnesses to negative the testimony of the plaintiff's witnesses or to establish the contrary facts. Included in the witnesses for the plaintiff will be a doctor or doctors who will testify that from a clinical and x-ray examination they are of the opinion that the plaintiff has silicosis and further that it resulted from working conditions in the defendant's plant or factory. The working conditions are described by the plaintiff and four or five of his fellow workers. If it isn't silicosis, it is tuberculosis superinduced by silicosis, or tuberculosis aggravated by silicosis. Exhibit "A," the plaintiff himself, if he has a sickly appearance, has more influence on the sympathetic jurors than have all the medical experts from here to the North Pole. Incidentally the kindly souls of jurors are so stirred up by the tales of expert witnesses with their mysterious phrases, x-rays and general display that the case is magnified in importance to such an extent that the jurors become very, very generous with the defendant's money and go home satisfied that they have done their little deed for humanity, completely oblivious to the part they are contributing to the burden on industry. This is exemplified by verdicts in silicosis cases ranging from $10,000 to $50,000. The most capable, persuasive defense trial lawyer in the country cannot stop the onslaught of a heavy verdict when the facts are fully presented by a clever, cunning lawyer for the plaintiff, and in most of the bad cases such a lawyer will appear—as the ambulance chasing lawyer is smart enough to call in as his associate to try his case, the most appealing jury lawyer that is agreeable to try the matter. The foregoing is only a part of the ramifications of silicosis claims. It would take several volumes to cover the situation fully, which is not necessary here, the main purpose of this article being to make the danger of the situation apparent to those interested.

INDUSTRY is concerned with the arrest and prevention of silicosis. Industry is also interested in preventing fraudulent silicosis claims and in the control of the situation so that compensation for such a condition is fair and not unduly excessive as it now is where the remedy is at common law. The arrest and prevention of silicosis will be left to the medical profession. The correction of the situation, from a legal standpoint, is in the hands of the state legislatures.

The only way the legal situation can be corrected is by proper legislation, and the burden is on industry to see to it that proper bills are placed before the various state legislatures and that they are enacted into laws. It will be necessary first, that silicosis and kindred sicknesses are taken out of common law and put clearly within the jurisdiction of the industrial commissions of the various states.

There are many benefits to be derived from placing silicosis under the workmen's compensation acts. There is a limitation as to the amount to be recovered. In practically all the workmen's compensation acts throughout the country, the defendant or respondent has a right to have the claimant examined by competent doctors at any time before a hearing. This right does not inure to the defendants in most states in the common law courts. The payment under the workmen's compensation act are made on the instalment plan and not in a lump sum. If a claimant is a malingerer, and, with the assistance of exaggerating expert doctors, he is able to obtain a large award, this award is paid on the instalment plan; and should the claimant's actions and movements subsequent to the hearing develop the fact that he is not disabled to such an extent as the award indicates, the defendant or re-

spondent can file a petition before the industrial commission to have the award cut down and corrected. The petition can be followed up by producing proper evidence to establish the facts. When times are normal even a malingerer gets tired of malingering and goes to work at some occupation that will pay him more money than the small weekly allowance derived from compensation payments. As the workmen's compensation acts of the various states now stand, the foregoing are some of the many benefits that will inure to industry by placing silicosis completely under workmen's compensation. The first step, therefore, would be to take silicosis claims and suits away from the juries and out of the common law until such a time as proper enactments within the scope of workmen's compensation acts can be made to apply more specifically to silicosis.

Our legislatures have had very little experience with silicosis, but the lawmakers of several other countries have—particularly the British in South Africa. And Canada has its silicosis laws. These laws are based upon experience and statistics and, in many ways, are not perfect. For example, in Canada it is necessary to prove three years of exposure before a claimant can recover. Doctors will agree that it is all a question of degree and also susceptibility. The length of exposure cannot very well be figured out by a yardstick. It will, therefore, be well in framing future legislation to procure enactments on the situation from various states and countries throughout the world and also to assemble medical data. It is a simple matter from a medical standpoint to estimate specific loss of use of any of the members of the human body, but considerable difficulty is encountered sometimes in estimating the damage done by an injury to the spine, and in the case of silicosis it is extremely difficult to figure accurately the loss which has been suffered by particular individuals. Doctors will agree that silicosis affects different people in different ways, but before it is possible to figure percentages of disability in a manner that even approaches accuracy, it will be necessary for doctors specializing in this and similar diseases to spend considerable time and study on the situation.

Under injury claims of various kinds the time limit within which one may file a claim or suit dates from the time of the occurrence or happening. In the case of silicosis there is in fact no single happening, and medical men state that silicosis sometimes occurs many years after exposure. It would appear, therefore, that some thought and consideration will have to be given to the time limit within which claims may be filed The time limit is referred to by lawyers as the statute of limitations. Another question that will arise in specific legislation on this subject is the question of exposure of one individual to the hazard in several different plants. Medical men will undoubtedly agree that it is impossible to determine to any extent the percentage of silicosis received during several different exposures, varying in length of time and intensity of exposure. These last thoughts are merely to indicate that it will be necessary to have the careful, joint consideration of capable lawyers and experienced doctors on these diseases before proper legislation can be enacted. It will not do to have any haphazard legislation, as the matter is so far-reaching that the results may be vastly harmful.

THROUGHOUT this article "silicosis" alone has been mentioned. Silicosis is supposed to be a disease of the lungs resulting from silica dust, and the use of the term would indicate that the only dust that is of concern to industry is silica dust. This, however, is erroneous. There are a number of similar diseases: *asbestosis,* which results from asbestos dust; *anthracosis,* resulting from the breathing of coal dust; *siderosis,* caused by breathing particles of iron; *chalcosis,* caused by the breathing of fine particles of copper. There are probably a great many other disease-causing dusts that have not occurred to anyone interested in this situation at this time, but for the purpose of this article all dust hazards are included. The medical authorities use the term, *pneumonoconiosis,* which literally means "a dusted lung." This word, though fitting, seems rather lengthy for the layman and will not be practical. It might have been proper to entitle this article "The Legal Aspects of 'Dust'" because it is intended to refer to all kinds of dust exposure.

Because sickness from dust exposure is commonly referred to as silicosis, there are many industries having a dust hazard that are not cognizant of the fact and remain in ignorance of it until they are greeted with a summons. Subsequent investigation and a conference with counsel bring home the fact that there is some merit to the suit, and that there is also an industry hazard that is going to prove expensive. The check-up will also often reveal, where there is insurance, that because this hazard was not known to exist there is no coverage for it, and that the problem is thus one which the company's lawyers will have to cope with and which the company will have to pay for.

Concluding, the writer wishes to emphasize the two propositions: *First,* that it is extremely important that silicosis and kindred sicknesses be taken out of the common law and made a part of the workmen's compensation acts of various states; and *second,* that later legislation should be well considered and should have the benefit of thorough study and research by capable and skilled medical men as well as the attention of lawyers fully cognizant of the needs and with original ideas as to the proper remedy.

Medical Service in Industry

A Statistical Outline—With Some Reference to Costs and Economic Returns

THE 1930 census lists nearly 49 million persons in gainful occupations. These and their dependents make up practically the entire population, and constitute the field of medical practice.

Medical service in industry, however, concerns only a part of the population, although a very large part.

Ten million people are gainfully occupied in agricultural pursuits, five million are in domestic and personal employment, while four million are in public and professional service. It can probably be shown that in the true meaning of the word all these are in "industry," but in the commonly accepted meaning of the term, only certain selected occupations are considered as being "industrial."

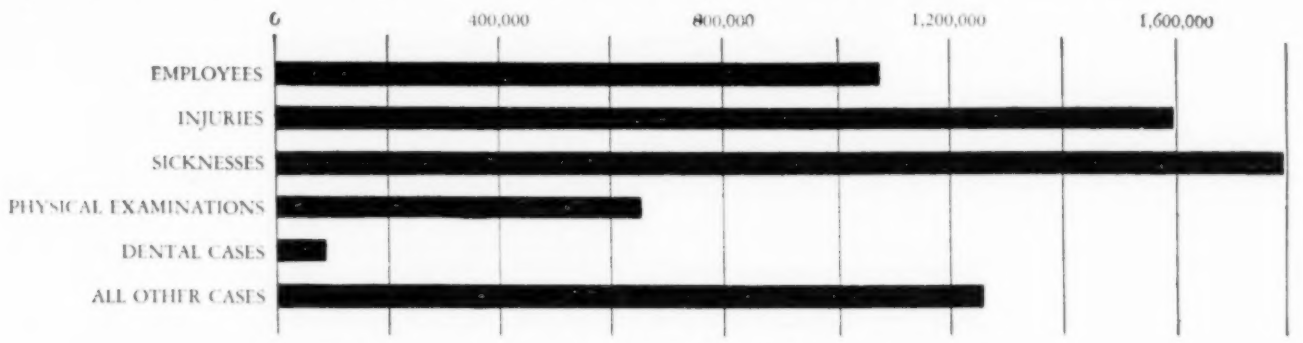
In one way, industrial occupations have been classified by legislation, especially that dealing with workmen's compensation insurance. A recently completed analysis of workmen's compensation indicates, in general, that only persons engaged in trade, transportation, communication, manufacturing, mechanical, and mining pursuits are subject to compensation laws. With certain exceptions, then, it may be said that these occupations constitute industry, and that the employees therein and their dependents are the field of medical service in industry.

The last census shows over 25 million persons gainfully occupied in these branches of industry, and since they amount to more than half the total number gainfully occupied, it may be concluded that the field of medical service in industry covers, directly and indirectly, half the entire population.

In four states there are no workmen's compensation laws; in 24 others employers having less than a specified number of employees are not covered by the laws; and in all the states there are certain groups of employees exempted (see p. 29). With this in mind, it is estimated that some 20 million or more persons are now included under the provisions of state workmen's compensation laws.

The 44 state laws in effect are of comparatively recent enactment, five dating from 1911, eight from 1912, four from 1913, and five from 1914; 40 were in effect by 1919, and one was added in each of the years 1920, 1921, 1926, and 1929. Revisions in these laws have been numerous, and each year witnesses many changes, principally by way of extension, expansion and addition. For example, all laws now provide for medical benefits, and 17 cover occupational diseases as well as accidents.

The result has been an increasing interest on the part of employers in matters of employee health and safety. Recent surveys indicate that more than 90% of the employees coming under the provisions of the laws have equipment for first aid available, and in many cases have complete medical facilities.



Source: "Medical Care of Industrial Workers," National Industrial Conference Board, 1926

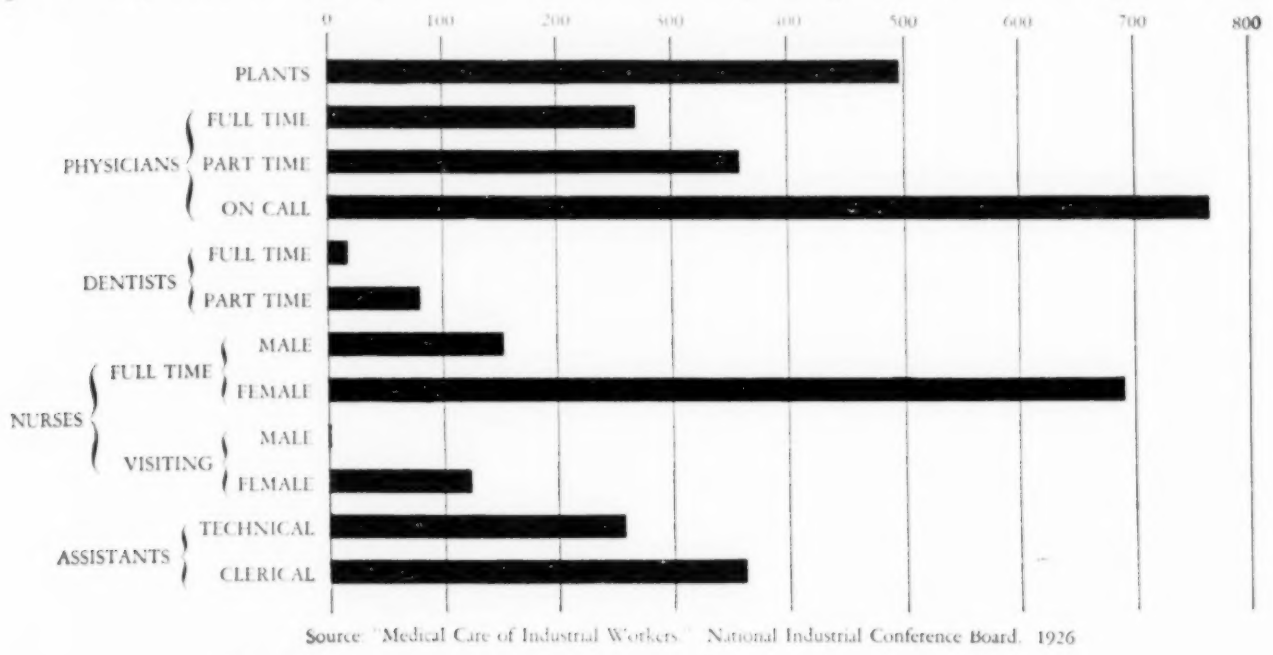
Annual Medical Service Rendered in 468 Plants

The compensation laws require that certain physicians be selected or appointed as the official compensation physicians of the employers, and that injured employees be placed under their care. Employers, however, have shown a decided tendency to go farther than the requirements of the law and to provide medical service over and above that actually necessary to comply with the law.

NO EXACT count has been made of the number of employers in each state who have established means of providing complete or partial medical service to employees, but spot checks of representative industries make possible some fairly accurate estimates.

A study by the National Metal Trades Association in 1929 (*Employee Medical Service*, by the committee on Industrial Relations) indicated that medical service in 60% of the more than 1,100 plants belonging to the association confined their medical service to employees to the provision of equipment for first aid to the injured and the minimum requirements of the compensation law. The other 40% rendered medical service to employees to varying degrees of completeness, some confining their activities to the treatment of injuries and preliminary treatment of sickness, others giving complete service in either accident or sickness, including dental, optical, x-ray and hospitalization. One-fourth of the shops reporting required physical examinations of all or certain classes of new employees,

14% extended the service to the homes of employees, for either the employee or members of his family. From this and similar studies, it may be estimated that medical service in industry is but barely established, covering at the present time approximately 80% of the industrially employed to the minimum required by law. Complete medical service to employees is provided by firms employing probably 12% of the industrially employed, and is extended to the families of probably less than 3% of the industrially employed.



Source: "Medical Care of Industrial Workers," National Industrial Conference Board, 1926

Medical Personnel Serving 1,116,562 Employees

THE COST of employee medical service is reported by the National Industrial Conference Board (*Medical Care of Industrial Workers,* 1926) to be $5.15 per employee per year. The Philadelphia Health Council and Tuberculosis Committee, in a report dated October 2, 1929, reported the cost of employee medical service to be $4.50 per employee per year under the Philadelphia industrial health unit plan. The National Metal Trades Association reported the cost of employee medical service to be $5.91 per employee per year.

Dr. Frank A. Poole, Director of the Bureau of Industrial Hygiene of the Michigan State Department of Health, in a survey of Michigan industry, collected the following figures:

From 20,000 to 25,000	$7.28
From 10,000 to 19,000	6.87
From 5,000 to 9,000	5.78
From 2,500 to 4,900	5.20
From 1,000 to 2,400	7.37
From 500 to 900	6.29
From 200 to 485	7.93
Average cost for each employee per year	6.67

"The costs range from $2.47 per employee per year to $22.00 per employee per year. In the latter case, the plant has a population of 1,800 to 2,000 employees; two half-time physicians, three full-time plant nurses and one full-time visiting nurse are employed; a fully-equipped industrial hospital is maintained, with an eye room, dental room, x-ray and physical therapy rooms, and the company requires careful employment physical examinations and periodic re-examinations of all employees. In two years' time the average lost time by illness has been reduced from eight days to 3.4 days per employee, and no days have been lost from infection." Less than one-third of the establishments surveyed by Dr. Poole could give reliable figures on the cost of health insurance. The majority had outside hospital services, compensation claims and other items all included in one segregation. Many did not keep accurate account of expenses, but stated: "the well-organized health department is worth while at any cost."

Contrasting the cost of employee medical service, to the degree it is now being rendered, with the cost of medical care to families as disclosed by a series of studies, shows the comparatively small extent to which industrial medical service has been established.

An investigation conducted by the Metropolitan Life Insurance Company (*Cost of Medical Care,* by Lee K. Frankel, 1929) covering the expenditures of 3,281 families for medical purposes over a six-months' period set the cost of medical care at $140 per family per year, or about $26 per person. The Committee on the Costs of Medical Care made a study (*The Costs of Medical Care,* by Sinai and Klem) of the medical expenses of 4,560 families over a period of one year. The costs thus established were $128 per family per year, or about $28 per person.

A study of the medical service rendered by the Endicott Johnson Corporation (*Medical Care for 15,000 Workers and Their Families,* by Niles Carpenter and others, Committee on the Costs of Medical Care, 1930) indicated that the medical service rendered by the company was as complete, if not more so, than that rendered by private practitioners in the same community. In the year studied, 1928, the service was available to over 40,000 persons. More than 35,000 used the service, resulting in an expenditure of nearly $900,000, which represents an annual cost of $25 per individual served, or $21 per potential user.

J. A. Diekmann, in *"The Modern Hospital"* of June, 1930, places the annual sickness bill of the nation at $16,000,000,000, which does not include capital expenditures for hospitals, loss of earnings, etc.

Harold A. Ley, in *"Hospital Management"* for November, 1928, stated: "Studies by the Life Extension Institute and the United States Public Health Service seem to have established the fact that among the 42,000,000 gainfully employed persons in this country the time lost from illness and non-occupational accidents amounts to as much as 350,000,000 days annually and

that at present there is from seven to nine times as much time lost through sickness as through accidents. The annual economic loss to this country from preventable diseases and death was placed by the Life Extension Institute in its report to the Hoover Committee on the Elimination of Waste in Industry at more than $3,000,000,000—$1,800,000,000 of which is among the gainfully employed. It was stated in that report, and has since been amply confirmed, that 25,000,000 in the working classes have defective vision requiring correction, that more than 1,000,000 have some form of tuberculosis, more than 8,000,000 have flat feet, more than 6,000,000 have organic diseases resulting mostly from infection, that there are more than 1,500,000 with venereal infection, and 500,000 working people die annually. At least one-half of this loss from death and disability is said to be preventable and postponable through proper medical supervision, periodic medical examination, health education, and community hygiene. In other words, an effective health program would result in saving $1,000,000,000 in industry every year."

THE exact economic value of a medical department has been almost impossible to establish. Even the direct and tangible returns are difficult to measure, although they may be estimated with a fair degree of accuracy. For example, an employer of 500 men in 1929 attempted to evaluate the effectiveness of his medical department. Among others this study included the item of absenteeism, and the figures related to the effect of medical service upon absenteeism are as follows:

Earnings of 500 men and women with no absenteeism	$815,217.00	
Earnings of 500 men and women with 5% absenteeism (actual)	750,000.00	
Employee loss through 8% absenteeism		$ 65,217.00
Company loss through 8% absenteeism	$21,740.00	
Employee loss through 5% absenteeism		40,760.00
Company loss through 5% absenteeism	13,580.00	
Saving from reduced absenteeism	$ 8,160.00	$ 24,457.00
Less company investment in installation of employee medical service	6,000.00	
	$ 2,160.00	

The prevailing rate of absenteeism had been reduced by 37½%, or from 8% to 5%, as a result of medical service. From this one angle alone there was an employee saving of $50 per year for each of 485 employees, or a company saving of 36% on its investment —in addition to reduced group and compensation insurance premiums, and elimination of 15 names from the payroll.

It is thus apparent that medical service is an important means of lowering manufacturing costs. And when the savings in reduced accident severity rates, insurance premiums, indirect losses due to accidents, inefficient performance of half-sick employees, to say nothing of the plant spirit or morale, are considered, there is every reason to believe that employee medical service is of major importance to the employer interested in reducing unnecessary waste and manufacturing his product at the lowest possible cost.

The following (from an article by Violet H. Hodgson, Asst. Dir., National Association for Industrial Health Nursing, in *Industrial Relations* for July, 1932, p. 333) is pertinent: "The National Industrial Conference Board reports a detailed statement of expenses and savings for the year 1930 prepared by a manufacturing company of 500 employees in an effort to determine the value of its medical department. The following items from this report are indicative of the tangible economic returns that can be expected:

Estimated total direct saving to company (Workmen's compensation insurance, workmen's compensation insurance premium, group life insurance premium, reduction of lost time because of better health)	$ 8,218.69
Less cost of medical department for 1930	6,397.57
Estimated *net total* direct savings to company	$ 1,821.13
Estimated total saving to employees (Annual estimated cost of medical care furnished free, savings in medical care of employees' families paid for by company, saving in premium on additional group life insurance paid by employees, approximate savings in wages due to 3% less time lost because of sickness)	$40,472.27

And National Metal Trades Association's summary of the general economic results from employee medical service is confirmatory. Its findings showed a 50.6% reduction in absenteeism, a 43.6% reduction in accident frequency, and a 28.7% reduction in compensation costs.

In practical terms, it may be said that medical service in industry has been established during the present generation. At the present time it is limited in scope, but there is every reason to believe that the trend of legislation, public opinion and the recognition of the economics involved are making imperative an early and accelerated expansion of its application. Indeed, the time may come in the very near future when medical service in industry is recognized as the most important branch of the profession.

The Expert Medical Witness

—His Selection, Qualification, Responsibilities and Behavior—

by

GEORGE H. CROFTON,

in Medical Bulletin of the Veterans' Administration

AN EXPERT medical witness is a person selected by a court or parties in a cause, who, possessing special knowledge and experience (as distinguished from common and judicial knowledge) in medicine or surgery is permitted to give his opinion, based on an assumed state of facts, with the thought that his conclusion or judgment is to be of value in settling the point at issue. The common law does not require that the expert witness on a medical subject shall be a person duly licensed to practice medicine. In most jurisdictions this requirement has been introduced by statute. A physician or surgeon who is engaged to treat and examine an injured person for the purpose of acquiring the knowledge necessary to qualify him as an expert is not necessarily disqualified as such by the fact that he also treated the patient professionally.

A subpoena (Lat., *sub,* under; *poena,* penalty) is a process to cause a witness to appear and give testimony, commanding him to lay aside all pretenses and excuses and appear before a court or magistrate therein named, at a time, therein mentioned, to testify for the party named under a penalty therein mentioned. A subpoena *duces tecum* is one wherein the witness is commanded to bring with him books or papers in his possession or under his control and to produce them in evidence. Whether or not the physician has in his possession the things he is directed to bring into court, he must, nevertheless, appear in person and be prepared to prove the impossibility of being able to bring the things called for in the subpoena—usually records, case histories, charts, roentgenograms, or other exhibits. The physician has no right whatever to exercise discretion as to what may be constituted privileged matter when a subpoena directs him to bring it into court with him. The physician's only legal duty is to obey the direction upon the subpoena. It is for the court to decide whether the matter is privileged or not.

It is an inherent power of courts to compel the attendance before them of a witness necessary to the trial of causes before them, and the statute sometimes gives a justice of the peace authority to subpoena the attendance of a witness at a trial in a court of record in his county. . . . When legally served with a subpoena, a physician or surgeon must become a witness if the court so directs; they have absolutely no choice in the matter. . . . If the physician is physically incapacitated from attending court, that excuses him. But he had better fortify himself with a certificate of disability from a brother physician if he would make certain of not arousing the ire of the court. Federal courts or boards may issue subpoenas which are effective anywhere in the country.

Once in court in response to a subpoena, the physician is placed under oath to tell "the truth, the whole truth, and nothing but the truth" as a witness. Violating that oath constitutes the crime of perjury. A physician can not refuse to give testimony without giving a valid legal reason for such refusal; under such circumstances a threat of contempt of court is very apt to be the swift reaction from the court.

An expert medical witness qualifies before the court that he has certain knowledge or skill concerning specific matter by virtue of which he is able to deduce logical, rational and correct opinions from a given set of facts involving the particular scope of his qualifications. His testimony, to be admissible as evidence must be relevant and competent, and usually it must be free from hearsay.

The credibility of expert witnesses and the weight of their testimony is for the jury, who may disregard it if convinced that it is not correct. Before experts testify, their knowledge and experience should ordinarily be inquired into, so that the court may determine their competency. When a witness disclaims being an expert, it is not conclusive on the court's determination of the question. Actual experience is not necessary to qualify as an expert but actual knowledge is necessary, and the court so held in *Hamilton v. U. S.* (26 App. D. C. 382) in which case a medical student was held as not qualified as an expert witness on insanity upon a showing that he had attended lectures on mental diseases. The test in determining the qualifications of an expert is whether his knowledge may aid the jury. Conclusions of law or of fact upon which the decision of the case depends are not permissible to be drawn in evidence by expert witness as, for examples, that a wound was either accidental or purposely inflicted, or that it was not accidental, or that the accused could have been shot by the deceased, or that it was impossible for the prosecuting witness to have fired the first shot, or that the wounds and bruises on the body were caused by a fall, or that anything the accused did could have caused the injury, or that an injury alleged in a charge of rape was caused by sexual intercourse, or whether a criminal abortion had been performed, or

what constitutes the "practice of medicine" when the defendant was being tried for practicing medicine without authority. Expert testimony is not proper to show the effect of a narcotic on the credibility of a witness, nor as to the intent of an epileptic. Nor is a physical examination a proper basis for an expert opinion on the veracity of the person examined.

Experts may testify positively on a subject, but they usually give an opinion, conclusion, or belief. A mere guess, conjecture, or presumption of an expert witness is objectionable . . . and is not admissible. He may give fact testimony (which is purely objective) or opinion testimony concerning matter of common knowledge, and also opinion testimony involving matter concerning which he has been qualified as an expert. Fact testimony is that which the witness has become aware of through one or more of his sensory organs—his eyes, his ears, his nose, etc. . . . Opinion testimony, in order to be admissible, as evidence, must be based upon facts and reasonable logic. . . . All opinions given by the witness are not admitted as evidence. For an opinion to be deemed competent and acceptable as evidence, the mental operation involved in its production must have as its basis rationality and reasonableness; remote possibilities or conjectures will never do as its basis.

The witness may have mistaken an auditory impression as to what he heard with the stethoscope, or he may have erroneously interpreted a visual sensory experience . . . but in either case a recital of his wrongly interpreted sensory impressions would form competent testimony acceptable as evidence, if everything else was equal.

It is the common thing for physicians to be qualified as all-around medical experts. Naturally, such an extremely broad qualification opens the road to practically any question that could be asked in the wide domain of medicine and surgery in direct examination. It might include any answer as implied facts in a subsequent hypothetical question calling for an opinion, and, in cross-examination, the witness thereby becomes open to questioning that may involve the entire field of medicine and surgery. Now, certainly not even the most egotistical medical witness would care to hold himself out as being qualified in such a broad sense. He is entirely within the rights of a medical witness to determine on what he shall and shall not be qualified as an expert.

Hypothetical questions seem to form a real bugbear for many expert medical witnesses. Naturally . . . the hypothetical question must be a biased and one-sided affair in order to be of any value as a piece of evidence carrying weight with those deciding the case. Certain facts more or less closely brought out during the testimony or in the form of objective evidence are combined into a single question—frequently an excessively long one—to which the witness is, as a rule, asked to give his opinion by replying "yes" or "no."

The witness must make some answer to the question, but there is no power on earth which can compel him to answer it in violation of his oath as a witness, so that if the question is misleading in its contents, the physician need not act contrary to his conscience. If the hypothetical question embraces implied facts which may be interpreted in several different ways, or is made up in terminology which is misleading and ambiguous, or contains facts entirely unacceptable as such to the physician, he invariably has the privilege of not being able conscientiously to formulate an opinion on the basis of the implied facts propounded in such hypothetical questions. In the famous trial of Harry Thaw for the murder of Stanford White, a medical expert answered a hypothetical question, which took several hours to read and several days to construct, by the simple reply of "I don't know."

No medical expert can be compelled to answer either positively or negatively a hypothetical question that is based either wholly or in part upon subject matter so arranged that he can not conscientiously give the reply asked for. A medical expert's answer to the effect that he does not know is the expression of an opinion, and is considered a reasonable and logical reply thereto. If the expert witness informs the court that he can not answer a given hypothetical question or any other question, because in so doing it would tend to violate his oath of office, then, if the court directs him to answer over such objections, it would be asking him to commit perjury, and no court would do that.

Cross-examination of an expert witness may be made to test his credibility and his competency. The extent and range of cross-examination of an expert witness is largely within the discretion of the court. He may be cross-examined as to whether he is being paid for his service as such a witness. He may be questioned as to the principles sustained in standard textbooks . . . when his testimony is based upon such authority.

The cause of death of a person is so considered within the range of scientific knowledge that medical expert testimony is admissible as to such cause, or as to the different ways in which the death might have been caused, or which of the several bullet wounds was fatal when a person died after being shot several times, or how long a person has been dead, judging from the heat of the body. Such testimony is not proper to contradict eye-witnesses. Evidence to prove the cause and manner of death may be given by a physician—as to the manner in which a mortal wound was probably inflicted, as to the kind of weapon used, as to the distance from which a shot was fired, as to the

degree of force employed, as to the direction of a blow, and whether the deceased could have inflicted the wound upon himself. If the witness states that death was caused by a certain weapon or instrument, he may show an instrument, properly identified as having been in the possession of the accused and may be asked if that would have caused the wound. Whether a wound was mortal is an inference for the jury so it is not necessary for a physician to give his opinion that the wound is mortal.

An expert witness on insanity need not be a specialist or an alienist, but he must be shown to have special knowledge, skill, learning, or experience concerning the subject. A physician who testifies that he has studied the subject of insanity is competent to testify on that subject. It has been held that if he has had experience in treating cases of insanity, and if he has practiced as a physician and surgeon he is not incompetent because he has not made insanity a special study. A medical witness may be permitted to testify on the question of insanity, basing his opinion upon a hypothetical question, though he stated that he was not an expert on insanity. The opinion which is expressed by an expert must be positive in form and character. If he can not or will not give such an opinion, his doubt that the accused was sane or his conjecture that he was insane must be rejected. Medical experts may testify as to the causes of insanity and their effects, such as psychosis resulting from drunkenness or from the use of cocaine. He may testify on the question of senile incapacity, the lack of physical development and its effects, the physical or mental condition resulting from a blow, or the inability to distinguish between right and wrong. He may testify as to the mental condition of one whom he has examined and give his opinion as to his sanity on the date of his alleged crime. But the expert who testifies as to the insanity of the accused should not be permitted to testify that in his opinion the accused was or was not capable of determining between right and wrong, or that he was of weak mind when he was neither an idiot nor insane person, nor whether he was mentally responsible while suffering from an insane delusion.

The medical expert who takes the stand with a fairly definite idea as to the ways and means utilized by counsel in seeking to achieve their object in handling witnesses is apt to be far better able to endure even a grilling cross-examination than he who fails to realize the other fellow's viewpoint and looks upon the task of being a witness only from the personal standpoint.

The witness must not ignore the all-important fact that among the legal profession all kinds of characters exist, just as in the medical profession. Conversely, among medical witnesses there are some who will take the little twittings and unpleasantness associated with testifying in a philosophical manner, while others are so constituted that a few interruptions or sharp words upset their psychological equilibrium, render them self-conscious, or so scatter their train of thought as to make them practically useless as witnesses. Before the medical witness undertakes to testify he should have thoroughly made up his mind that it is part of the task of the opposing lawyer to try to make him out a liar, a fool, or a knave during cross-examination.

It is reasonable, logical, and scientific that if the witness encounters lawyers who utilize psychology rather than law in endeavoring to win their cases the witness, in turn, must be prepared to counteract their attempts.

Among the more common tactics utilized by some trial lawyers for the purpose of disturbing the normal mental equilibrium of the witness are the raised voice, menacing gesture, rapid-fire questioning, innuendoes, implying ignorance, impeaching veracity, intimating prejudice, and many other tricks.

By a comparatively simple method it is quite possible to take much of the fire out of the trial lawyer's bull-dozing tactics. The best antidote for such acting is for the witness to utilize the psychological weapon of contrast, by pursuing the conduct of a perfect gentleman according to the best usage of the accepted standards of etiquette. This will have a double effect. Primarily, psychological contrast of an extreme nature in behavior clearly shows up the bull-dozing lawyer's inferiority; and, secondarily, it becomes the means of making the continuance of such tactics extremely inadvisable for the lawyer.

The witness should face the jury, or, where there is no jury, the judge, when testifying.

If rapid-fire questioning takes on the nature of seeking to make it appear that the witness lacks the required knowledge to answer the propounded questions, then he should lose no time in turning to the court and respectfully asking for a reasonable time to answer each question . . . . and the court will gladly comply with such a reasonable request.

The task of being a medical witness involves such psychological complexities as highly concentrated attention, unobstructed associational activities capable of reinforcing the powers of memory, reasoning, and judgment, and involves deep thinking. The medical witness who thoroughly appreciates and takes cognizance of the psychological factors involved in being a witness before taking the stand is most adequately prepared to meet them by efficient means of counter-attack if occasion demands.

The object of all testimony is to aid the judge or jury by means of facts or opinions, enabling them to come to a just decision concerning the matter under

trial. All statements made by the expert medical witness under oath from the stand are not considered privileged communications and can not be held against the witness later. . . . Witnesses are not expected to be infallible in their memories, nor in the formulation of opinions, but are required to make an honest endeavor to tell the truth and to be fair in giving testimony. The two exceptions to privileged communications while on the witness stand are perjury and disobeying or disrespecting the court. Either of these constitutes contempt of court, and may be punishable on the spot.

SUMMARY: 1. An expert medical witness is selected by the court or parties in a cause because he possesses special knowledge and experience. His testimony is to aid the judge or jury by means of facts or opinions, thus enabling them to come to a just decision concerning the matter under trial.

2. An expert medical witness qualifies before the court that he has certain knowledge or skill concerning the specific subject, by virtue of which he is able to deduce logical, rational, and correct opinion from a given set of facts involving the particular scope of his qualifications.

3. A physician may be compelled to attend court as a witness when served with a subpoena.

4. Whenever a physician or surgeon takes the witness stand for the purpose of giving testimony involving medical matters, he must use the simplest possible language and also explain the meaning of all technical terms. He who is capable of explaining his point of view in the simplest terminology is the one whose testimony carries the greatest weight.

5. The test in determining the qualifications of an expert is whether his knowledge may aid the judge or jury.

6. Experts may testify positively on a subject, but they usually give opinion, conclusion, or belief.

7. It is within the medical witness' legal rights to determine what he shall and shall not be qualified on as an expert.

8. The witness must make some answer to the questions, but in doing so he can not violate his oath as a witness.

9. When the testimony of an expert is not based on an authorized text book, it is improper on cross-examination to read extracts therefrom conflicting with the opinion of the expert.

10. An expert witness on insanity need not be a specialist or an alienist, but he must be shown to have special knowledge, skill, learning, or experience concerning the subject.

11. In the legal profession all kinds of characters exist, just as in the medical profession.

12. On the witness stand the physician should pursue the conduct of a gentleman, according to the best usages of the accepted standards of etiquette.

13. The witness should face the jury, or, where there is no jury, the judge, when testifying.

14. All statements made by the expert medical witness under oath from the stand are not considered privileged and can not be held against him later.

15. While on the witness stand, perjury, or disobeying or disrespecting the court constitutes contempt of court, for which the witness may be punished.

References:

1. 40 Cyc. par. 2233.
2. Underhill, *Criminal Evidence*, pp. 185-193.
3. Scheffel, Carl, *Medical Jurisprudence*, pp. 190-192 and 205-225.

Preventive Medicine

MY ATTENTION was recently called to a large employer of labor who not only requires each employee to have a physical examination upon entrance, but also to submit to an examination each six months. The results in life and health conservation have been quite unusual. . . . The commercial world is slowly but surely demanding the practice of preventive medicine. We have no interest in state medicine but stand firmly for the wider practice of prevention by our private and personal physicians. Nor do we find any reason to regard seriously professional criticism we sometimes see hurled at the physician who accepts a post in the industrial world. After looking over the annual net earnings of the average physician, we believe that the doctor, too, must live."—H. W. Stanley, in *Texas State Journal of Medicine*, May, 1932.

A Professional Responsibility

PRESENT-DAY trends demand that medical organization be vitally concerned about, and take an active interest in, governmental, legislative, social and economic questions. The antiquated theory that organized medicine should not bother about civic and public affairs, especially if they be political, has been discarded. Although the medical profession and medical organization, especially, are essentially nonpolitical, it is their responsibility and obligation to take a personal and united interest in public problems in accordance with the fundamentally sound, concerted medical view on matters affecting public health, medical practice, scientific medicine, and the social-economic status of physicians. It is highly important that the medical profession, individually and collectively, keep itself accurately informed, and endeavor to form effective contacts with office holders so that sound policies and principles of medical organization may be explained to and understood by them."—*Ohio State M. J.*, July, 1932.

Some Recent Decisions

—In Connection with the Operation of Workmen's Compensation Laws—

by

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MANY recent decisions under the workmen's compensation laws of the various states cite instances of interest to industrial managers and medical relations executives. These decisions frequently will establish precedents for the guidance of all those interested in industrial relations, thus saving time and expense.

Humor and pathos fade in and out on the screen of compensatory and non-compensatory accidents. For example:

A girl employed by a jewelry concern in Ohio was compensated by the state when she swallowed beads she was supposed to sell, but the efforts of a widow with five children to trace her husband's death from cancer of the tonsil to a kick received by a horse failed.

A travelling man who stubbed his toe in a sleeping car received compensation, but the widow of a drummer who was killed in an automobile accident when joy-riding with a customer and a couple of girls received nothing, although she claimed her husband was catering to the whims of his customer.

Baldness won a $3,750 award from one state, although the recipient received only a wrenched leg. Specialists agreed that fright caused the injured employee to lose his hair. The industrial commission ruled that baldness would operate against the employee obtaining employment in many lines, but denied a claim of $17.50 for shaves for a claimant who was confined to the hospital with an amputated hand.

In another state the referee denied an award for false teeth, as the claimant had not been disabled for 14 days.

Pennsylvania's industrial commission is of the opinion there is nothing legally unsound in allowing a claim for artificial teeth, but is of the opinion that the loss of a nose is not compensable unless disfigurement or disability is shown.

The Supreme Court of Louisiana thinks it is an error not to allow a claimant compensation for the loss of teeth, even though the teeth are replaced by artificial teeth, although this court does not consider a disfigurement of a hand compensable.

In Ohio the cost and repair of false teeth, broken when a piece of steel flew and struck them while the employee was engaged in work, was paid for out of the state insurance fund.

Concerning disfigurement, an interesting case is that of an employee, a girl, who was burned about the body when some inflammable liquid with which she was working took fire. She was compensated for temporary disability and returned to work at a normal wage. Later, she filed an application for an adjustment of the claim, alleging she was entitled to additional compensation for scars on her body. In his report, the state medical examiner vouched for the scars and was of the opinion that while they are covered by claimant's clothing they might prove an embarrassment in case she married. The state commission allowed the claimant an additional amount of $937.50.

The industrial commission of one state awarded a workman $2,487.13, with $12.33 a week for several weeks for a mosquito bite, which had infected the workman's tongue.

The Supreme Court of Colorado has ruled that under the workmen's compensation act of that state injury to a wooden leg is not a personal injury.

The Industrial Commission of Ohio has ruled that the breaking of a wooden leg is a compensable injury. Recently the commission allowed a claim and directed an employer to pay the cost of repair of an artificial limb.

A workman struck by lightning in Ohio is not entitled to compensation, according to a recent ruling by the Industrial Commission of this state, as the commission considers his disability results from an act of God.

Minnesota has ruled that death resulting from lightning is only compensable when the employee is so exposed to injury by lightning as necessarily to accentuate the hazard.

The Industrial Commission of California has made a similar ruling concerning applications for compensation for injuries due to earthquake.

The Supreme Court of Oklahoma has ruled that an injury suffered as the result of a fall caused by an attack of epilepsy is not one arising out of employment, and is not compensable under the workmen's compensation law in that state.

If an employee does not encourage hugging and is hugged anyway, the resulting hug producing a fractured rib, such injury is occupational and entitled to

compensation according to a recent ruling of the Industrial Commission of Ohio.

An assistant superintendent of a light and water plant had as one of his duties the placing of copperas in the waters of a reservoir. A fellow employee went with him in a boat to do this work and testified that the official said he was going to "duck him," and began rocking the boat. The vessel capsized and the assistant superintendent was drowned. The Industrial Commission of Ohio denied the claim for death award on the grounds that it adhered to its usual attitude on "horse play."

In another case, this commission denied compensation to an employee who had sustained a fractured rib in a scuffle which he precipitated with a fellow employee. In another case, an employee was sprinkling the floor and turned the hose on a fellow employee. The latter grasped the hose and turned on the aggressor, who ran and accidentally threw his hand under a saw which severed the hand, all but the thumb The claim for compensation was denied. In the case of a caddy at a golf course who was injured by another caddy who playfully threw a knife, the claim was allowed as the claimant was not the instigator of the "horse play."

In Ohio, a workman started out on order of his employer to paint a temporary garage which was only partially under roof. He went to a nearby building to change his clothes and while changing his clothes he lost his balance and fell through a hatch fracturing his vertebrae. The industrial commission ruled since the accident did not occur on the premises where the work was being carried on and the necessary change of garment could have been made in the building where he was to work and where a hazard did not exist, they could not allow the claim.

An unusual claim was that of a domestic employed in a fashionable home in an Ohio city, who was struck by an automobile while on her way to church and sustained serious injuries. In support of her claim for compensation claimant presented proof that one of the conditions of her employment, and that of all other servants employed in the home, was that she attend church on Sunday. In view of the circumstances the commission held she was injured in the course of her employment and allowed her claim for compensation.

Running over a dog with a truck is an accident likely to happen incidentally to the duties of a truck driver, and if truck driver is bitten by a dog after the truck ran over it, while carrying it into its owner's house, he is entitled to compensation, under the compensation act, in most states for the disability which he suffered.

A workman in New York was setting up a stove pipe. The pipe case came apart and fell, striking the bridge of his nose. Lacerations left an oblique scar three-fourths of an inch long. The industrial commission awarded him $100 for facial disfigurement. The carrier's attorney upon appeal asked "if this is 'serious' what would be 'trivial'?" and the Attorney-General replied, "If Helen of Troy had a scratch on her face, could Marlowe have said: 'Is this the face that launched a thousand ships and burned the topless towers of Ilium'?" The Appellate Division, finding no evidence that the scars disfigured claimant's face seriously, reversed the award and dismissed the claim.

Broad application was given to the Ohio Workmen's Compensation Law recently when the Ohio Supreme Court upheld a judgment for $6,500 as a death claim which resulted when, as a student presented a rose to an instructor, the instructor's thumb was pierced. Blood poisoning developed causing the death of the instructor.

An employee of a telephone company became enraged over a reprimand from a foreman over the way he was performing his work and was knocked down by the foreman in a return blow for the one he dealt. The employee received a dislocated elbow, but no compensation, as it was not of or arising out of employment.

On the other hand, the New York Courts recently held the employer responsible in the case of a foreman who struck and permanently injured the eye of one of his workmen, because the workman called the foreman a liar. It was the opinion of the Court of Appeals, that the employer should be held responsible for an excitable and violent foreman in the prosecution of his duties.

The general rule underlying practically all the workmen's compensation laws is that the workman or his family is entitled to compensation for injuries or death arising in or out of the course of his employment; and some neat and interesting points have arisen concerning just what is and what is not in course of employment.

It is a fundamental concept of the workmen's compensation laws that an accident resulting in disability, in order to be compensable, must have been an unexpected and unforeseen event which happened suddenly and violently and produced at the time subjective evidence of injury.

Therefore, an injury to be accidental must be traceable to a definite time, place and cause, excluding the anticipated and natural consequence of continued labor.

For example, a palmar abscess which develops as a result of blisters caused by continuous use of a wheelbarrow is not compensable in the State of Ohio, the industrial commission rules.

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EDITORIAL

The Industrial Physician

THE INDUSTRIAL PHYSICIAN AND SURGEON must be familiar with industrial organization, manufacturing processes and the various accident hazards and toxic materials of industry. The industrial executive must be familiar with the economics of medicine and law as related to industry. The constantly growing interdependence of industry and medicine, and the increasing importance of the relation of law and insurance to both, are rapidly creating a special field that may well be called industrial medicine. And so we call it that, and herewith introduce ourselves.

Answering now the obvious questions:

1. We are the publishers of *Industrial Relations.*

2. Our field is the industrial interrelation of medicine, law, insurance and economics—in other words, the economics of the relation between the medical profession, the legal profession, and the business of insurance on the one hand, and the employer who is paying for the services of these professions and this business on the other hand.

Industrial Medicine recognizes that the practice of medicine in any and all of its branches is the sole right of an individual—the right of an individual who has secured special knowledge through years of preparation and who has demonstrated his ability to make practical application of that knowledge for the good of humanity to the satisfaction of a properly constituted licensing body.

Human welfare demands of medical practitioners the keenest sense of responsibility. A sense of responsibility is not inherent; it must be developed through a full realization of the gravity of the circumstances the outcome of which is, in a certain degree, wholly dependent upon the physician. Therefore, the maximum benefit of medical science to humanity may be obtained through the recognition by the practitioner and by society that the physician is solely responsible for his acts.

Corporations, partnerships, foundations, institutes, and other organizations are inanimate and, as such, are incapable of acquiring the special knowledge necessary for the practice of medicine. And they are unable to develop the sense of responsibility so fundamental to personal welfare and the benefit of humanity. Such organizations cannot legitimately or morally usurp the privileges that through more than 2,000 years of human experience have been recognized as the sole right of individuals qualified in accord with the demands of society.

Industrial Medicine recognizes, too, that scientific medicine has a definite place in modern industry. Technological developments, certain legal problems, plant sanitation, health maintenance and the general welfare of employees make the application of the special knowledge of the physician an industrial necessity.

The development of industry through the application of the sciences, particularly chemistry and physics, is bringing the worker in contact with an increasing number of toxic materials. The adoption of workmen's compensation acts by the different states is bringing about a correlation of medicine and law with a consequent enlargement of the field of medical jurisprudence. To correct occupational disease and accident hazards and to prevent legal complications it is essential that particular attention be paid to the hygiene and sanitation of the workers' environment.

The preservation of the health of the worker through the prevention of disease and accidental injury add to the efficiency of both the wage earner and industry. For the improvement of the general welfare of the employee, through guidance in recreation, through the care of minor injuries and illnesses, and through proper placement in his job, the special information of the physician is of inestimable value.

Mass production so fundamental in our economic life demands that the human element function just as efficiently as the mechanical element. This means that jobs be analyzed, and that workers be examined for their anatomic, psychologic and physiologic characteristics to secure a proper adjustment.

Technological developments in mechanical equipment tend toward the elimination of the worker from industry at an earlier age than heretofore. Hence, there arises the problem of increasing the years of in-

dustrial usefulness of the employee. Since physical defects, disordered physiology and the degenerative diseases are the primary causes for the disability of the employee tending toward elimination from the industry, the correction and prevention of these defects is of primary importance.

The prematurely aged and the physically handicapped workers present a problem of proper placement growing in importance because of the economic necessity on the part of the worker and the avoidance of possible liabilities by industry.

The industrial physician, by careful consideration, must equitably balance the needs of the worker, the avoidance of liability by industry and the welfare of society, and must be familiar with the many connecting links between his profession and the industrial organization with which he is associated.

Failure to appreciate the scope of their opportunities in these respects has caused many industrial physicians to lose much prestige. As a result many of the duties that should rightfully be theirs have been assumed by others. And the fact that most industrial physicians have failed to function as administrative officials has also been the source of much unnecessary interference. Meddling with the sick and injured in industry, just as in private life, is a favorite pastime of the untrained. This invariably leads to the aggravation of otherwise minor injuries and illnesses, and not only prolongs the period of disability but, what is far more important, increases the final cost under compensation.

INDUSTRIAL MEDICINE

"PAST *experience in industrial medicine has now developed its proper domain. The health problems of workers entail an annual loss of* $8,000,000,000. *Scores of industries are maintaining medical departments conducted along lines conducive to the elimination of their share of this* $8,000,000,000 *proposition. This group, however, forms but a small minority, and the vast industrial interests of this country are sorely lacking in these facilities. This sort of good industrial medicine is little known to the manufacturer or to the medical profession. The spurious variety has blinded both groups. The manufacturer has often failed to find much value in the medical services rendered in his factory. He is unimpressed and is turning to sources other than medical for near medical service. The greater number of services carried out in industry by these professions and trades bordering on medicine (governmental departments, insurance companies, statisticians, sanitarians, hygienists, psychologists, pseudopsychiatrists, chemists, safety engineers, optometrists, food faddists, efficiency experts, engineers and nurses) are often properly within the scope of activities of the well-trained physician."*—Carey P. McCord, M.D.

Pussyfooting on Silicosis

WE ARE ADVISED—from lay, not professional, sources—to make small and very guarded mention, if any, of silicosis. Asking "why" elicits the following:

Some employers are afraid it will be added to the list of occupational diseases under compensation laws. Others want it added, fearing that if it is not soon included the racketeering methods described in Andrew J. Farrel's article (p. 35) will bankrupt them.

The one group says "Hush! Hush!" lest the business of bringing the situation to legislative attention be got under way. The other says "Hush! Hush!" lest the ambulance-chasing lawyer and his medical copatriot in questionable practices learn how much money can be made in silicosis cases and how easy it is to make it.

But bills are already drawn in two industrial states that we know of to bring silicosis under the compensation laws. More than *our* failure to mention the matter will be needed to prevent their affirmative consideration. And it is not in our power to prevent the lawyers who want to learn about silicosis from having their business-hunting medical associates send to Canada and England for the rather voluminous published material available there—which seems to be the common practice, although American medical literature since Lanza and Hopkin's first study, which was published in 1915, has covered the subject very well.

Meanwhile the self-imposed silence of the employers who are going to *pay* the judgments is continually broken by the strident questions of the lawyers and the smug answers of the doctors who are using their professional standings and abilities to *get* them.

And so we intend to discuss silicosis from the standpoint of knowledge gained. For it is not the facts that are to be feared; it is the lack of them.

A Source of Trouble

INGUINAL HERNIA is by far the most frequent form of hernia and of greatest importance from the industrial standpoint. It has been estimated that this defect is present in one out of each 30 men taken from all walks of life. It is fairly common to

find a well developed hernia in a man who was previously ignorant of its existence. In such instances any accident leading to the discovery of the hernia may be regarded by the man as the cause for it, and a dispute may arise. As Dr. James W. Davis points out (p. 9), a careful physical examination at the time of employment serves a useful purpose in determining the general physical condition of the employee and preventing controversies that may arise over a hernia.

Controversies of this kind are by no means infrequent. Angerstein says: "In actual practice herniae have presented one of the most troublesome problems or situations and claims have been made in many cases and employers have been held liable in many cases of hernia due solely to diseased conditions without accidental injury. . . . In cases where the hernia is due to accidental injury and the condition is such as to require an operation, the necessary medical and hospital treatment should be definitely tendered so that it can be later proved, if necessary."

Contract Medicine

BY SPECIAL request of the active head of the hospital association I am withholding the name of the clinic handling the foundry clients. The staff members are afraid that old-line members of the medical profession may seek to oust them from the medical societies for taking cases on a contract basis. The feeling within the ranks of the profession is rather apprehensive, hence the recipients of the work, although they are glad to get it, desire to keep the facts under cover."

These words accompanied the medical-aid contract sent us from Seattle, Washington (p. 33).

In his booklet on "The Cost of Medical Care," Michael M. Davis, Director for Medical Services, Julius Rosenwald Fund, says: "When it is proposed that medical services be furnished on some organized basis, we are confronted with the fear that organization will stifle the essentially personal service of the doctor. 'Machine-made medicine,' 'department-store medicine,' 'medical slaves serving patient robots' are some of the phrases used to describe the clinics, the insurance and other organized plans. Let it not be forgotten that the patient has an interest in this question as well as the doctor and the dentist. You and I as patients want to receive a personal service when we are sick. We want to feel that the doctor is interested in us and not merely our illness; that he is giving us something of himself and not merely some time which we are paying for."

But Simons and Sinai, in their new book, "The Way of Health Insurance," comment as follows: "When, as is increasingly common, medical care is contracted out to organizations formed for that purpose, the abuses multiply. This situation already exists on the Pacific coast, where such medical organizations have undertaken contracts with many firms and where the results have given rise to much concern among medical professions. This 'farming-out' of the medical service to another society simply accentuates and aggravates every disagreeable and undesirable feature of the relations between societies, patients, and professions that exists in the worst systems of Europe."

Books

BENZOL (BENZENE) POISONING. A NEW INVESTIGATION OF THE TOXICITY OF BENZENE AND BENZENE IMPURITIES. By Carey P. McCord in collaboration with Nora Cox and Charlotte O'Boyle. 2nd Edition, 84 pages. Industrial Health Conservancy Laboratories, Cincinnati, 1932. $2.00.

"The purpose of the present volume is two-fold; to present certain newer evidence concerning the toxicity of highly purified benzene and of certain of the impurities found in commercial benzene, and to provide the medical practitioner with a review of present day knowledge of benzene poisoning.

"In the studies of various grades of benzene absorption of these substances was brought about by inhalation, the test animals being guinea pigs and rabbits. . . . These studies disclosed all the various types of benzene to be capable of producing poisoning in the test animals. Studies on skin absorption of benzene were conducted on 10 rabbits. . . . The author concludes that 'benzol in contact with the skin, in addition to causing a dermatitis or kindred skin lesion, is capable of producing systemic poisoning.'

"The studies of the toxicity of the impurities of benzene were confined to a study, by inhalation, of acetonitrile, thiophene, amylene, methyl disulphide, and carbon disulphide. Again rabbits were used as the test animal, and the substances, as before, were administered by inhalation. These studies, according to the author, do 'not provide any evidence tending to place the burden of benzene toxicity upon its impurities.'

"The second object of this study—namely, the provision of an adequate review of the subject of benzene poisoning for the guidance of the medical practitioner, is certainly well achieved. The symptomatology of benzene poisoning, the medico-legal aspects of the disease, its treatment, and the protection against benzene, are well presented. Those interested in the medical aspects of this subject will find this portion of the monograph of value. The volume is replete with references to the literature, and the terminal bibliography is a reference source of real value in this field."—*Industrial and Engineering Chemistry*, August, 1932.

Industrial Medicine Digest

Foot Ailments Cost to Industry

ILLINOIS MEDICAL JOURNAL, *editorial* (July, 1932):—Statistics show that foot defects are on the increase in the United States and that annually through the inefficiency caused by pain and discomfort industry suffers a loss of some $100,000,000. It is contended that nine out of every 10 adults are afflicted with some form of foot ailment; that of this number 68% are among women and 32% among men. During the late war, for the first time in the country, the scientific measurement of the feet was undertaken on large groups of men and from these measurements it has developed that one-half to three-quarters of the men in the country were wearing shoes from half a size to two sizes too small. So far as the army was concerned, this difficulty was corrected in the interests of efficiency.

Not only do defects of the feet occur from ill-fitting shoes, but the entire posture of the individual also is affected adversely by these difficulties. If for any reason, the ability to walk is handicapped, there is a risk of losing the amount of exercise that would naturally be taken if the feet were comfortable. A vicious circle is, therefore, obvious.

It is said that an army travels on its stomach, but is no better than its feet—much of what is good for the army is good for the civilian, and this is particularly applicable in industrial life.

Occupational Disease Reporting in Pennsylvania

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, *Medical News* (June 4, 1932):—It is announced that the State Department of Health of Pennsylvania requests hospitals, physicians, and other persons to report all cases of anthrax, anthracosis, poisoning by aniline, arsenic, benzol, chromium, lead, manganese, mercury, dinitrobenzol, and other industrial substances, and silicosis. Such cases are reportable to local health officers, but special reports direct to the State Department are also requested.

Reports of lead poisoning are to be made also to the Department of Labor and Industry. The Department of Health has announced that increased attention is to be given to the occupational diseases mentioned.

Gloves in Industry

SIR KENNETH GOADBY, *in the regular letter of the London Correspondent to the Journal of the American Medical Association* (April 23, 1932):—In visiting Canada recently, Sir Kenneth Goadby, medical referee for industrial diseases, observed the general use of gloves in many industrial occupations. Engineers and stokers on steamers, railroad employees, road makers, scavengers, and threshers and reapers wore gloves.

In England, gloves are not worn to any extent during industrial work, but Sir Kenneth believes that such protection would greatly reduce the risk of industrial dermatitis, which is increasing year by year, although some other industrial diseases, such as lead poisoning, are diminishing, because of preventive measures.

Most industrial dermatitis is caused by the handling of substances which are apparently innocuous, such as sugar or flour in baking and similar industries; dyeing; french polishing; building; laundering, and others.

According to Sir Kenneth, the objection that gloves obstruct the nimbleness and free movement of the fingers cannot be maintained. For many years gloves have been used by surgeons in performing the most delicate operations, and heavy gloves are commonly used in the electrical industry. Sir Kenneth believes that the use of gloves would rapidly diminish, if not entirely prevent, industrial dermatitis, and that the increased cost would soon be met by decreased compensation charges.

Tannic Acid Treatment of Burns

DR. DONALD M. GLOVER, *Surgery, Gynecology and Obstetrics* (May, 1932):—The author gives his experience in the tannic acid treatment of burns for a period of six years adopting the following criteria of the effectiveness of any method of burn treatment: (1) Does it save lives? (2) Is it comfortable to the patient? (3) Does it minimize complications and sequelae? (4) Does it favor healing? (5) Is it practical and economical?

As a comparison of mortality experience, 310 consecutive burn cases treated by the tannic acid method have been reported by Glover, with a mortality of 9.6%, while 121 treated by various methods prior to 1926 gave 14%.

The answer to Glover's experience is, therefore, "yes" to all the above criteria with the exception of question (4): tannic acid treatment has no essentially beneficial effect on epithelization.

The summary of this experience is as follows:

1. Burns should be regarded as emergencies and treatment started at the earliest moment.

2. Burned areas can be sprayed with a 5 or 10% tannic acid solution, while the patient remains under a heated cradle.

3. An adequate amount of fluid should be administered to combat dehydration; at the same time care is taken not to overload the circulation with fluids.

4. Continuous wet dressings using Dakin's solution are employed to hasten separation of the coagulum during the "secondary toxic stage." This stage has been described in the original article.

5. Early skin grafting is recommended to prevent development of profound secondary anemia, to diminish danger of late septic complications, and to prevent unnecessary scarring or contracture.

6. The treatment of chemical or electrical burns involves the same principles as those caused by heat.

Health Hazards of Floor Cleaning Materials

ABSTRACT, *from Bulletin of Hygiene and Journal of Industrial Hygiene* (April, 1932):—Dr. Thomas M. Legge calls attention to dangers to health accompanying the use of floor cleaning materials, most of which consist of mixtures of ceresin and paraffin with resinous and waxy compounds as fillers.

Since the war, a great deal of terebene and tetralin have been used; these have been known to cause headache and distress even in non-industrial exposure, where bedrooms have been recently treated with them.

More recently in the cleaning of schoolrooms, mixtures of plant and mineral oils have been employed. Instances have been reported where persons engaged in cleaning operations became ill with headache, vertigo, nausea, the illness lasting several days.

Animal experimentation with various fractions of the distilled substances showed that the fraction which did not distil over caused deep narcosis after the spraying of the animal cages with it. Both carbon tetrachloride and chloroform were detected in the fractions considered poisonous. Methane derivatives, according to the authors, induced narcosis more readily than ethane derivatives. The blood examinations showed no pronounced alteration from the normal.

Silicosis in Women

ABSTRACT, *From the Journal of American Medical Association and the Journal of Industrial Hygiene* (April, 1932):—Gudjonsson reported six fatal cases of silicosis in women working for a period of years, under adverse conditions, in the manufacturing of scouring powders.

Among two survivors, one had marked silicosis; in one other employed for a period of approximately six years silicosis is not yet clinically demonstrable.

Acute Silicosis

DR. EARLE M. CHAPMAN, *in the Journal of the American Medical Assn.* (April 23, 1932):—Although it is recognized that chronic silicosis usually follows exposure to sufficient concentrations of free silica dust, it was not until 1929 that Heffernan showed that acute silicosis resulted from comparatively short exposures to alkaline silica mixtures in the manufacture of scouring soaps.

The author presents the case histories and findings on three exposed persons, in which the appearance of respiratory symptoms occurred after exposures of eight, 21 and 29 months, to an alkaline dust of high silica content. It is believed that these cases show a more rapid and severe development of silicosis than is usual.

References to other rapidly-developing cases have been made. Russell reported a fully developed case in a lens grinder who inhaled pure quartz spray for eight months. In the study of granite cutters made by the U. S. Public Health Service, the earliest case found without symptoms, detected by roentgenograms, occurred after two years of service; MacDonald observed two rapidly fatal cases in young girls employed for 33 months and 51 months, in packing a similar type of alkaline silica soap.

The findings in these cases suggest that the reaction in the lungs is not a direct and quantitative one, but that it results as Heffernan believes from the accelerated formation of a silica hydrosol in the presence of alkaline soap dust. Such a reaction usually progresses slowly and may in certain cases be so prolonged that symptoms do not appear until some years later, as shown by Britton in reporting several cases of this type.

It is believed that these three cases of acute silicosis are among the first to be recorded in American industry.

Silicosis Hazard—Use of Pneumatic Rock Drills

THEODORE HATCH, GEORGE S. KELLEY, AND J. WILLIAM FEHNEL, *Safety Engineering* (June, 1932):—The findings in this article result from the cooperative study of the New York Department of Labor, the Metropolitan Life Insurance Company and the Department of Industrial Hygiene of the Harvard School of Public Health. The report is concerned mainly with the application and efficiency of the Kelley dust trap for use with the pneumatic rock drills of the "jackhammer" type.

Previously in the recommendations of the silicosis committee appointed to advise the New York Department of Labor on the preparation of a code to cover rock drilling hazards, the following suggestions were made:

1. Rock drilling, blasting, and excavating in New York City constitute a serious hazard to the health of workers, owing to the constant exposure to silica dust, resulting in silicosis and tuberculosis. Remedial measures are urgently needed.

2. Efforts must be made immediately to improve markedly, by controlling the dust concentration, the conditions under which men employed in these occupations are compelled to work.

3. Compensation should be granted by law for disability due to silicosis.

A description of the Kelley dust trap is given both in words and by means of drawings; an outline of the experimental study is made, including the measurement of dust sampling by the Greenburg-Smith impinger in accordance with standard procedure.

As a summary of this investigation, the following statements may be made: Dust concentrations at the breathing zone of the drill runner were correlated with the rate of air flow through the hood. Adopting a standard of permissible dustiness of 5,000,000 particles per cubic foot of air, the rate of air flow necessary to reduce the dustiness below this value was found to be 60 cubic feet per minute. A number of check tests with the trap operating at this rate showed that it was satisfactory and that it could be used as the basis for design of dust control equipment for rock drills of the jackhammer type. Static suction requirements at the hood and in the suction manifold, using four different lengths of two-inch hose, were determined for various rates of air flow.

The data given in this study are of great importance, since they bear on one particular phase of silicosis hazards in industry and can be applied to conditions where rock drills are used in excavating and tunneling through formations which contain harmful amounts of free silica.

Industrial Sickness During 1931

HEALTH NEWS, *U. S. Public Health Service* (May 5, 1932):—During 1931 the sickness rate was somewhat higher than in 1930 on account of the epidemic influenza in the first quarter of 1931. Exclusive of influenza, the 1931 sickness rate was the lowest of any year during the last decade.

A low rate of new cases of tuberculosis of the respiratory system was evident during 1931. There was a remarkable decrease of diseases of the upper respiratory tract, especially for acute and chronic bronchitis, for diseases of the pharynx and tonsils (chiefly tonsillitis), the rates for these diseases being below the frequency shown for any of the preceding 10 years.

Digestive diseases as a whole showed rates below the average for the preceding 10 years, but certain digestive diseases failed to pursue a declining trend, the most notable decrease, however, being recorded for diseases of the stomach (except cancer).

The incidence rate of nonrespiratory, nondigestive diseases was below the annual average frequency from 1921 to 1930.

Certain subgroups, however, showed an excess of the 10-year average, especially diseases of the heart, diseases of the genito-urinary system (except nephritis), and diseases of the nervous system. Favorable changes include a substantial decrease in the frequency of rheumatism (acute and chronic), diseases of the skin, and the epidemic and endemic diseases, exclusive of influenza.

Industrial Sickness, First Quarter, 1932

DEAN K. BRUNDAGE, *Public Health Reports* (July 15, 1932):—Although a mild epidemic of influenza prevailed among male industrial employees as well as the general population during the first four months of 1932, according to the Metropolitan Life Insurance Company, the low death rate for pneumonia "has never before been even closely approached during the like period of any year."

The morbidity rates for the important diseases of the upper respiratory tract, such as bronchitis, acute and chronic; and diseases of the pharynx and tonsils, including tonsillitis, were also relatively low.

For nonrespiratory diseases, as a whole the rate was practically the same as in like months of 1931. The frequency of minor digestive diseases exhibits no trend one way or the other. The hernia rate is practically the same as for the first quarter of each of the four years under review.

In summary, sickness as a whole showed a remarkably favorable rate. If the influence of the mild influenza epidemic is deducted, the first quarter of 1932 displays the lowest sickness incidence rate during the years 1929-1932.

Cost of Occupational Disease Coverage

F. M. WILCOX, *(personal communication) Proceedings of the Seventeenth Annual Meeting of the International Association of Industrial Accident Boards and Commissions* (Published April, 1931):—The question of cost of occupational disease coverage, especially when it is complete, has been a disturbing one among industrial employers. Extracts are taken herewith from a personal communication of Mr. Wilcox, because they are very enlightening:

"You will note from Bulletin No. 24 that during the 10-year period ended December 31, 1929, we disposed of 3,019 cases of occupational disease. The indemnity benefits aggregated $576,264, and the medical benefits, $140,688, or a total of $716,952. In that same period, the total number of cases disposed of aggregated 200,791, for which indemnity of $31,553,150 was paid and the cost of the medical service was $10,076,266, amounting in all to $41,629,376. . . . When proper deduction is made (for the fact that 45% of the cost of cases in the occupational disease experience of the State of Wisconsin falls within a class that does not depend on the 'occupational disease amendment' to secure benefits) the cost of our full coverage amendment for the 10-year period is about $385,000 out of $41,629,000.

"This is slightly less than 1c out of each dollar. While students of the subject will understand that the occupational disease hazard is very likely to vary somewhat from state to state, there is no reason for believing that the hazard for the country as a whole averages more serious than for Wisconsin, and this observation is supported by the experience of the states that now compensate this type of injury.

"Whether the added cost will prove to be 1c or 2c or 5c on the dollar or any other figure is not material. It is a question of the responsibility of a state to provide morally upright legislation. Are we, because of pennies, willing to tolerate longer within the otherwise beneficial provisions of our compensation laws the rawest and most unconscionable piece of discrimination that was ever conceived? Are we to continue paying generous credit to a system that cares for those who suffer injuries to the head, the hands, the feet, but denies relief to him who suffers injury to the heart, the kidneys, the lungs, under the same identical employment and with less, if anything, of personal responsibility? It is high time we ceased back-paddling on matters of principle and right, and guarded against the adoption of laws or the continuance of laws which the laborer has assumed to be in response to basic principles, only to find that they are instruments for unfair discrimination and filled with avenues for denial of his rights."

Dust Sampling Apparatus

DR. LEONARD GREENBURG AND J. J. BLOOMFIELD, *U. S. Public Health Service Public Health Reports* (March 18, 1932):—In the introduction the authors give a discussion of the various kinds of dust sampling apparatus used in the past 20 years, with a review of the literature. The apparatus described, namely the Greenburg-Smith Impinger, consists of two portions: a device providing a source of sufficient suction to draw the air through the sampling device; and the sampling device or impinger proper, consisting of a container, impinger tube and plate. Cross-sectional views of both these types of apparatus are shown in the original article. Methods of sampling and counting are described in detail, and computation of results is considered.

The authors summarize their work as follows:

"The object of the present contribution has been to describe the design and construction of an apparatus for the sampling of atmospheric particulate matter. This device, known as the impinger apparatus, possesses the advantage of high dust-catching efficiency when sampling air over the full range of dustiness (from relatively pure outdoor air to that found in the very dusty coal-mining operations) at the relatively rapid rate of 28.3 liters (1 cubic foot) per minute. The dust is caught in a liquid medium in which it may then be counted and analyzed microscopically, gravimetrically, and chemically. Three forms of the instrument are described: The electrically-driven, the compressed-air driven, and a hand-actuated form. Photographs and drawings of the apparatus have been provided. The results of the sampling of various dusts, as well as of chromic acid mists and lead fumes, are cited in order to show the range over which this instrument may be used."

Efficiency of Antiseptics

DRS. W. F. VON OETTINGEN, O. V. CALHOUN, V. A. BADERTSCHER, AND R. E. PICKETT, *Journal of the American Medical Association* (July 9, 1932):—This is essentially an investigation of mercurochrome—220 soluble and a comparison of its efficiency with other antiseptics.

A general discussion of antiseptic efficiency is included in the original paper, with data given on experiments relating to the antiseptic action of mercurochrome on bacterial cultures, the local bacteriostatic action of mercurochrome, the penetration of murcurochrome compared with gentian violet and iodine, the penetration of mercurochrome in the mucous membranes, the diffusion of mercurochrome through frog skin, the toxicity of mercurochrome for living tissue, and the effect of mercurochrome on ciliary movements.

The authors reach the following conclusions:

1. It appears that mercurochrome, when once fixed on the surface of the tissue, develops no bacteriostatic action in contact with bacterial cultures.

2. It penetrates only into the dead or dying mucous membranes of different organs, such as bladder, vagina and digestive tracts and it may diffuse through the cornea when in contact for a sufficient period.

3. Mercurochrome does not penetrate the living skin but is fixed in the most superficial layers of the epithelium and it does not penetrate or stain normal muscular tissue.

4. Penetration is accomplished through necrotic and dead tissues and the dye stains them deeply and permanently.

5. The tissue toxicity of mercurochrome is relatively low, but the 5% aqueous solution is distinctly injurious as judged by excised ciliated mucous membranes.

The authors further explain and interpret their experiments, making comment as follows:

"Mercurochrome cannot be relied upon to destroy bacteria that have penetrated into the living tissue of a wound or of the skin; it could do no more than disinfect the surface and the necrotic tissue. This limitation is shared more or less by all antiseptics so that no substance can be properly called a safe and certain wound antiseptic. No antiseptic takes the place of thorough cleansing and surgical treatment. When these are not practical, for 'first aid' or for very superficial wounds, antiseptics are probably better than no treatment at all. The antiseptic efficiency of mercurochrome is not outstanding, and for skin disinfection the aqueous solution is distinctly inferior. The absence of irritation may be an advantage, especially with open wounds, and for prolonged treatment; but its limitations should always be borne in mind."

Industrial Chemicals and the Skin

SIR THOMAS M. LEGGE, *Abstracted in the Bulletin of Hygiene and the Journal of Industrial Hygiene* (April, 1932):—Twenty chemical groups are mentioned as being injurious—nitrous fumes, phosgene, carbon monoxide, hydrogen sulphide, hydrocyanic acid, benzol, aromatic nitro and amido bodies, dimethyl sulphate, methyl bromide, methyl alcohol, lead, phosphorus, arsenic, chrome salts, manganese, mercury, zinc, thallium, and uranium.

The principle upon which injury is caused is an interference with the usual oxidation and reduction processes of cell life, some substances acting as reducers and others as oxidizing agents.

In the oxidation group, exposure to aniline leads to hyperkeratoses and epithelioma, similar to the way the so-called mother substances (from which aniline is derived) of tar, pitch and petroleum products lead to direct skin cancer.

Phosphorus and arsenic on the other hand act by their strong reducing action, leading utimately to death of tissue cells of which the hyperkeratoses of the palms of the hands and the soles of the feet are evidence. Bichromates are active oxidizing agents and only disturb the reduction phase of cell respiration, but as nitro derivatives are less poisonous than amido derivatives, so bichromates are less dangerous than arsenic.

A similar line of reasoning is pursued in the poisoning processes of carbon monoxide, hydrocyanic acid, dimethyl sulphate, nitro and amido derivatives of benzol and thallium.

Hypersensitiveness and allergy in relation to eczema are discussed, providing the following figures from international authorities: Chajes of Berlin estimates, among 1,750 cases of eczema, that 53% are occupational; Oppenheim of Vienna estimates 20%; Prosser White of England 6%; while in America, Hazen puts the figure at 20%, Knowler at 33% and Gardiner at 68%.

Changes in Growing Bones in Clinical and Experimental Lead Poisoning

DR. C. K. DRINKER, *Abstr. from Radiology and Journal of the American Medical Association in Journal of Industrial Hygiene* (June, 1932):—Caffey has reported three cases of chronic lead poisoning in children, all of which showed changes in the roentgenograms of the long bones. These changes consist of increase in the density of the growing portions of the skeleton, the non-growing portions appearing normal roentgenologically.

In the two cases of children who recovered, the roentgenologic appearance consisted of a series of transverse lines behind the diaphyses and linear rings of density in the ossification centers of the epiphysial cartilages and the carpal bones, similar to those previously reported as being diagnostic of healed scurvy.

In the one case that came to necropsy, examination of the gross and microscopic changes of the distal end of the femur indicated that roentgenologically, there is pronounced anatomic change present at the sites of increased density; the anatomic changes consisted of a hyperplasia and packing together of trabecular bone in a narrow zone contiguous to the proliferating cartilage.

It is of interest to know that the roentgenologic and anatomic changes in clinical cases of chronic lead poisoning were reproduced experimentally by feeding lead to growing dogs. Chemical analyses of both human and dog's bones indicate a lead deposit throughout the bones, with a higher lead content in the subepiphysial zones of roentgenologic and anatomic change than in the remainder of the shaft.

In one case lead feeding for 79 days in one fully grown dog did not result in either roentgenologic or microscopic changes, although lead was detected in these bones chemically.

Practical Hints on Arthritis

DR. HENRY KELLER, *International Journal of Medicine and Surgery* (June, 1932):—In the diagnosis of arthritis the proper interpretation of x-ray films is very important. The author makes the following suggestions in regard to x-ray interpretation and diagnosis:

1. Both limbs should be x-rayed at the same joint region, also taken at the same angle, and the soft as well as the osseous tissues should be made visible, otherwise, the picture taken is only partly valuable.

2. Focussing the tube at a greater distance, and the use of a soft ray, will make the visibility of the soft tissues possible.

3. At times both joints when x-rayed may show the presence of pathology, although the pains and other symptoms for which the patient seeks relief may be present in one joint only. In such cases comparative study of the two affected joints will be of no avail. The knowledge of the appearance of a normal joint of that region at the same age of the patient is the only available comparison worth considering.

Dr. Keller then discusses the various types of arthritis, mentioning especially the investigation of 1459 cases of chronic arthritis by Dr. Benjamin H. Archer, of which 771, or approximately 53%, belong to the chronic infectious group;

370, or approximately 25%, being arthritis of the menopause or degenerative in type. In this series only 12 cases or less than 1% presented the typical features of both forms of the disease in the same patient, these being discussed in detail as follows:

1. There is a mixed form of chronic arthritis characterized clinically by the presence of grating knee-joints, Heberden's nodes and fusiform fingers.

2. That this form of chronic joint disease presents the typical pathologic lesions of proliferative and degenerative arthritis in the same joint.

3. The proliferative lesions seem to be less virulent and progressive than in younger people. The degenerative lesions are similiar to those present in the arthritis of the menopause.

4. This form of arthritis appears to be a combination of two entirely different pathologic conditions. The first is an inflammatory and the second is a degenerative process. The order in which they arise in an individual patient may be dissimilar.

5. Treatment to be effectual should be directed toward the combating of an infectious disease and towards the alleviation of the degenerative process.

6. While the clinical and pathologic evidence does tend to separate chronic arthritis into two main divisions there are borderline cases that overlap both types.

The author also includes a discussion of typhoid and tuberculous arthritis, manipulative surgery for the correction of deformities in chronic arthritis, the diagnosis of the presence of adhesions in the joint cavity, and the ideal anesthetic for arthritis patients.

Compensation Settlements as Therapeutic Measures

DR. HENRY H. KESSLER, *Proceedings of the 18th Annual Meeting of the International Association of Industrial Accident Boards and Commissions, October 5-8, 1931* (Bulletin of U. S. Bureau of Labor Statistics No. 564, April 1932):—The author gives a series of illustrative cases showing that two types of reactions are evident when cases are settled on a lump-sum basis: in one series the symptoms disappear, but there are other cases in which the symptoms do not disappear when such settlements are made.

One case is selected as illustrating the difficulty in arriving at a decision as to the causative factor in the production of a right-sided paralysis: "A German girl, aged 27 years, working as a maid in a private home had always been well and presented no external evidence of disease and no limp. She had been in the country only six months and was ambitious to learn the language, so she went to night school. One day she fell from a ladder, striking her head. She continued working the rest of the day and attended school that night. No medical attention was asked for. The following day she continued work and went to night school. The next day she worked but felt ill, had headache, chills and fever, did not attend school that night. A physician was called and diagnosed the case as one of grippe with threatened pneumonia. The following day another physician was called by the maid's sister, who attributed the illness to her fall, although the injured herself did not feel resentful. This physician stated that he found evidences of severe swelling and ecchymosis and that a bronchopneumonia was impending. She was removed to the hospital where her lung condition in five days resolved by crisis and where the diagnosis of bronchopneumonia was further corroborated. Five days later she became irrational, presented changing pathological reflexes in both lower extremities, was excited, and developed an impairment of power in the left arm and a limp in the left leg. On account of her unruliness she was removed to the psychopathic ward of the city hospital, where her psychotic symptoms disappeared. All the reflexes returned to normal, but she retained the limp and the weakened attitude of the arm and hand. When she presented herself for an examination the condition was manifestly functional. There was no evidence of any organic involvement. With this knowledge at hand, it remained for us to decide the responsibility of the employer in the causation of this neurosis."

The author spoke of the following possibilities in this case:

1. That the hemiplegia was the result of the brain injury sustained at the time of the accident. (However, the absence of any organic changes ruled this out.)

2. The possibility that the hemiplegia was a functional residuum of an encephalitis as demonstrated by the organic changes described.

3. That the hemiplegia was the result of some other psychic inhibition.

The question, therefore, was not one of diagnosis but the determination of the cause of the functional disorder. The commission had interpreted the condition in the terms of a time relation, a cause and effect sequence, and since it was reasonably possible that such a functional condition could have resulted from a minor injury, an award for compensation was made for this injury.

Although the procedure in New Jersey has not been uniform, the author states that the practice in his district has been to put all cases of neuroses into three major classes:

1. Those patients suffering from a desire neurosis—that is, desire for compensation.

2. Those suffering from a functional neurosis, the result of injury, such as fright and other circumstances surrounding the injury, which class has been described as a true traumatic neurosis.

3. Those suffering from neuroses due to unexplained complexes or mental conflicts.

Dr. Kessler sums up his paper as follows:

1. Settlement as a device for arbitration of compensation of claimants suffering from neurosis is a sound practice.

2. Consideration should be given to the fact that the adjustment after settlement may not be immediate, but may be gradual and may take one to two years.

3. A small percentage of cases will not be benefited, due to wrong diagnosis or to other mental conflicts at the bottom of the neurosis.

4. There will be a certain number of cases of real psychopaths whose reactions will be mistaken as falling into the category of the neurotic.

5. Finally, to recapitulate, traumatic neurosis is a social disease and requires social remedies. In this instance a physician can only prevent; the judge must cure.

In discussing this paper Dr. F. H. Smith of Abingdon, Va., summarized his conclusions favoring a lump-sum settlement as a therapeutic measure, in the following statement:

1. Every injured workman is a potential neurotic.

2. It is the neurotic element which is the main difficulty in sizing up the case and fixing the percentage of disability.

3. However serious the physical difficulty, this complication prevents or retards rehabilitation, therefore

4. Every effort should be directed toward preventing or relieving the disordered mental condition while expertly handling the physical injury.

5. To this end, a most important consideration is the matter of financial settlement.

6. Secondary in importance therapeutically only to the fact that an award is forthcoming is the manner of settlement.

7. It is counting too much upon frail human nature to expect the man to recover so long as he is being paid a dole, and there are other doles due. The argument that, since he is still being paid through the order of a governmental agency after a full hearing, he must still be incapacitated, is too strong for him to resist. How can he get well! If the dole system serves only to prolong the period of invalidism, and yet the man has to have his desire for compensation satisfied or must readjust himself mentally before he can recover, the only reconciliation seems to be—

8. An award in one sum, under certain necessary safeguards, at the first moment possible to determine the extent and duration of physical and neurotic disability, so as to—

9. Close the case once and for all.

Industrial Hygiene Experience

DR. C. O. SAPPINGTON, *National Safety News* (August, 1932):—This article is an abstract of a previous paper on "Industrial Medicine as a Specialty" by Dr. Paul A. Davis, which considers mainly the necessity for employee selection and important points relative to industrial dermatitis.

The following recommendations were made by Dr. Davis, regarding the selection and placement of employees:

1. A tall individual with a disproportion of distance between shoulders and pelvis, and pelvis and feet, should not be put on a job where lifting must be done from the level of the feet.

2. Light-weight individuals should not be placed on jobs involving heavy lifting where the weight to be lifted reaches 75% or more of the body weight. The muscles of the body function in lifting procedures most efficiently if their factors are calculated in terms of fulcrums and levers—when such factors are disproportionate, strains may occur.

3. Fair or so-called light-complexioned individuals should not be exposed to irritating substances, which may cause a dermatitis. Such persons are more susceptible than brunettes or dark types.

4. Persons showing chronic bronchitis should not be exposed to volatile substances or dusts of an irritating nature.

5. It is especially important that female workers should be protected or kept away from lead, benzol, arsenic, aniline, and other types of poisonous exposure—for they frequently develop abnormal menstrual difficulties.

6. Employees with nose and throat infections should not be placed in dusty surroundings or in an environment containing irritating vapors.

7. Individuals with flat feet should be placed in occupations where there is no necessity to stand or walk for most of the day.

8. Persons having focal infection in the teeth, tonsils, or other portions of the body should not be placed on work where there is possibility of the development of muscle strains, or joint disorders; frequently such infection has prolonged disability, the increase of absenteeism, compensation, and cost of medical care.

9. Employees with defective vision should not be given inspection jobs, or work involving the necessity for acute vision.

10. Applicants showing history of any lung or kidney disease, although apparently not active at time of examination, should be placed carefully where there is the least possibility of causing a recurrence of these diseases.

11. Epileptics are to be construed as liabilities.

12. Persons with dilated inguinal rings should be considered as potential hernias and should not be placed on jobs requiring heavy lifting.

13. Asthmatics or other employees having hypersensitive reactions should not be placed in a dusty environment or one involving exposure to irritating substances.

Industrial dermatitis and dermatoses exist in great frequency and it is important that the industrial physician be familiar with the use of manufacturing materials in his plant, which may be the source of irritation to the skin and also be aware of the presence of hypersensitive individuals in the plant personnel. "Patch" tests may be made, affording some definite information. The following points are recognized as being important, concerning the appearance or manifestation of skin irritations:

1. The absence of any visible reaction—the presence of itching and burning;
2. Redness, accompanied by burning and itching;
3. Formation of blisters, with oozing;
4. Pimples either with or without pus;
5. Roughened skin—with evidence of plugging of glands;
6. Dry, scaly, or eczematous skin; and
7. Discoloration, because of exposure to dyes or other substances.

The causes of these evidences of skin irritation have been summarized as follows: (a) excessive heat or cold; (b) dusts; (c) chemical compounds; (d) hypersusceptibility to various nontoxic substances; (e) friction and mechanical irritation; (f) exposure of skin to certain light rays; (g) inhalation of various chemicals; and (h) absorption of certain chemical compounds through the alimentary system.

Cadmium Poisoning

DR. LEON PRODAN, *Journal of Industrial Hygiene* (April and May, 1932):—The author states that extensive industrial use of cadmium is comparatively recent, although cases of poisoning were reported as early as 1858.

Material on experimental cadmium poisoning is reviewed, a comparison being made between the toxicity of cadmium and zinc on experimental animals, pathological protocols are given showing the finding of various amounts of cadmium in the viscera of cats, and data are also presented relative to the excretion of cadmium by patients treated with cadmiol.

Literature is reviewed for material on cadmium poisoning in man; the physical and chemical properties, the occurrence and extraction and uses of cadmium are also set forth. Details are given relative to the health hazards associated with the handling of cadmium in various manufacturing processes.

A comparison is made of poisoning by inhalation and poisoning by feeding, and methods of prevention are suggested.

The author reaches the following conclusions based on a review of the literature, and experimental work:

Of chief importance is the evidence offered relative to cadmium poisoning by inhalation, since poisoning occurs practically entirely through the respiratory system, although the least work has been done on this previously.

In inhalation experiments, cadmium oxide fume and dust and cadmium sulphide dust were used.

In high concentrations cadmium oxide produces edema of the lungs, resulting in the death of animals. In small

amounts, there is generalized pneumonia and bronchopneumonia, emphysema, and atelectasis.

The oxide produces changes in the liver, varying from the general granulation of the cells to a fatty infiltration; kidneys likewise show fatty infiltration, the other organs in general not being affected.

Animals exposed to cadmium sulphide dust showed symptoms from 24 to 36 hours following exposure, consisting of vomiting, diarrhea, occasional salivation, and increased rate of respiration, which was dyspneic and noisy. Pathological processes encountered are generalized pneumonia and bronchopneumonia, accompanied by edema, extensive emphysema and mechanical atelectasis. The lungs usually are the only organs affected, although there is a small percentage of cadmium found in the liver and kidneys. The difference in the distribution of cadmium sulphide and cadmium oxide is explained by the greater insolubility of the former compound. No blood changes were noted.

Cadmium carbonate and phosphate were used in feeding experiments causing vomiting with salivation and loss of appetite. Irrespective of the dose used, the liver and kidneys were affected with more pronounced lesions in one or the other. Cadmium is retained in the liver in greater absolute quantity and in the kidneys in greater relative quantity, the bones also retaining a high percentage. No definite blood changes were seen.

In the prevention of cadmium poisoning, the use of the respirator is recommended where the percentage of cadmium contained in the material handled is small; a soda lime cartridge should be attached to the respirator when acid fume is present in the atmosphere breathed. Masks should be used in all cases where the cadmium content is high and adequate ventilation is the most important consideration in the prevention of cadmium poisoning.

Medical Program for 10,000 Employees and Their Families

DR. DANIEL J. KINDEL, *Executives Service Bulletin* (July, 1932):—This is a description of the medical program for the employees (and their families) of the Consolidation Coal Company, at Fairmont, W. Va. The object of this program is "the treatment and care of sick and injured employees and their families, the application of hygiene, sanitation and education, with the objective in view of preventing illness and keeping the employees of our communities in good health."

The evaluation of industrial medical service involves more than the usual economic viewpoint. A contended, healthy and happy workingman is recognized as a good producer—freedom from sickness and suffering is a major factor in maintaining this much-sought-for balance. Mental and emotional strain in any employee is a result of illness or something in his family which unquestionably affects his productivity and value. Any service which tends to cut down this type of difficulty is valuable not only to the employee, but to the company as well.

Tangible results occurring from medical services may be reduced to monetary values and may include: reduction of absenteeism and turnover due to illness; compensation and insurance control; the elimination of bad physical risks; occupational disease hazards; and workmen who are "unsafe" because of poor physical or mental conditions.

The successful operation of a medical department requires, (1) money; (2) medical personnel, particularly qualified in industrial medicine; (3) a definite objective and program; and (4) the wholehearted support of the executives of the company.

In certain industries employees contribute an amount varying between $1 and $2 per month to provide ordinary medical care for themselves and families. This system probably originated because of the difficulty experienced in getting physicians in certain communities where industries form the backbone of the community population. Employees of the Consolidated Coal Company contribute in this manner toward the expense of medical care, but in addition the company pays its share by underwriting the expense of the program of health and preventive medicine carried on by a staff of 12 qualified public health nurses.

The personnel of the medical department proper consists of 22 full-time physicians, several dentists and a 50-bed accredited hospital. In addition, special arrangements are made for the care of the employee and the members of his family for securing care from private hospitals, institutions, and consultants.

During the year 1931, 163,024 persons received medical attention; of this number 42,678 were visited in their homes. Dr. Kindel considers 80 to 85% of these cases as minor illnesses, for the most part preventable.

The details of the service are numerous: every new employee is given a thorough physical examination; when accepted a complete record of the social, economic, health and other problems is made of the family. Instruction is given in proper hygiene and sanitation of the home, explaining the importance of immunizations for typhoid, smallpox and diphtheria which are carried out as time allows. The program is, therefore, divided into two distinct phases of which the first relates to problems of illness and health which may be defined under the term "hygiene"; the second, problems of a community nature which may be included under the term "sanitation."

Approved methods of inspection and testing are applied to milk and water supplies constantly over periodic intervals. Food handlers are given especial attention. Organized school health supervision, monthly clinics for infants and young children, clinics for expectant mothers and tuberculosis clinics are all provided for. There are community social activities, such as Boy and Girl Scouts programs, church clubs, and civic and other activities, and monthly medical staff meetings for nurses and physicians, and demonstrations of cases are carried out.

The program has been carried on for five years, and, although there is room for a great deal of improvement, much has been accomplished. Adequate follow-up of both individuals and groups is to be stressed. The outstanding lesson in this experience is that death, sickness and ill-health decrease as progress is made in prevention.

Medico-Legal Aspects of "Spontaneous Fractures"

DRS. KURT GARVE AND C. E. EARLY, *International Journal of Medicine and Surgery* (June, 1932):—The authors cite various cases and bring out certain points, also referring to standard medical works and to citations by courts and by statutes.

In summarizing the medical portion of the subject, they conclude:

1. The proper name for "spontaneous fracture" is pathologic fracture, false fracture, or pseudo-fracture.

2. False fractures are always due either to general affec-

tions, infections, or hereditary dispositions, or they are due to local infections, tumors, or foreign bodies.

3. A pathologic fracture requires a definite pathology as an underlying cause, to justify the diagnosis.

4. The facts in the case of *Newton* v. *Industrial Accident Commission of California et al.* (Cal.) 267 Pac. 542, are as compatible with a true traumatic fracture caused by violent pull of the muscles of the thigh as with the theory of a pathologic fracture in absence of the showing of some inherent pathology of the bone or the bony system.

5. The absence of excoriations, bruises, or contusions is not proof that the fracture has not occurred on account of violent means.

6. A refracture occurring during the yet incomplete process of healing should not be called a pseudo-fracture, and should be regarded as the interruption of the normal process of rehabilitation of the respective bone.

7. If a fracture occurs through a previous fracture line, no conclusion can be drawn exclusively that such fracture and refracture are due to "spontaneity."

8. The syndrome of lack of signs of external violence, of absence of a fall, and of visible extraordinary motions, or any other happening of such character, does not conclusively prove that fracture or refracture is pathologic as the term is used in medicine.

9. The medico-legal aspects of pathologic fractures are not properly recognized by attorneys, claim adjusters and physicians and surgeons.

10. Pathologic fractures are more common than one may think.

11. Pathologic fractures may lead to suits for personal damages, erroneously supposed to be due to malpractice, or they may become matters of concern in criminal, other civil, and workmen's compensation cases.

12. Obviously x-ray pictures are of paramount value in cases of false fractures.

13. In most cases a properly trained medical man is able to recognize a pathologic fracture.

14. Attorneys, claim adjusters, and medical men should go well into details of life history of claimants where there is suspicion of pathologic fracture.

15. Slight exertion, mild injuries, undernourishment, nervous diseases, and other conditions should put the investigator on guard as to the possibilities of pathologic fractures.

16. Claim adjusters, attorneys, physicians and surgeons should always keep in mind the possibility of a pseudo-fracture whenever cases seem to be extraordinary from the standpoint of causes of such fractures.

Inexpert Refraction

DRS. JOHN GREEN, JR. AND CARL BEISBARTH, *Journal of the American Medical Association* (July 9, 1932):—The subject of refraction is one that has assumed great importance in industrial medicine. The authors outline the following reasons for inexpert refraction:

1. There is the ophthalmologist who is "not interested in refraction." Is this not almost tantamount to a declaration that he is "not interested in ophthalmology?" If ophthalmology has any attraction for him, it lies in diagnosis, therapeutics and operations. Closer inquiry will usually reveal the fact that he has received just enough insight into ophthalmology to realize that refraction tests require precious time that might be more lucratively employed. It is our positive conviction that this type of practitioner is far less frequent now than he was 20 years ago and it is to be hoped that he will eventually become as extinct as the "dodo."

2. Some ophthalmologists have so many "irons in the fire" that they have "no time for refraction." The demands of teaching, the pursuit of original research, the writing of papers, the attendance at engagements outside of professional life, and the exigencies of private and consulting practice (which may include ear, nose and throat work) render it physically impossible to "do refractions." Therefore, this part of the practice is delegated to a medical assistant. Possibly this may be unfortunate for the latter, who is apt to adopt the ophthalmologic habits and concepts of his superior. In such circumstances it is not surprising that the young man soon comes to regard his job as irksome and hopes for an early relief from its drudgery. However, there are many offices in which the arrangement works well because the chief is interested and is expert in refraction and supervises the work of the assistant, and later when the assistant becomes expert, is still willing to offer advice and counsel. In lieu of a medical assistant, an ophthalmic technician—usually a recent graduate from a women's college—can be trained to serve a very useful purpose in the preliminary tests. However, there should always be a check-up and revision by the ophthalmologist, as the patient should have the benefit of his mature judgment in writing the prescription, and his opinion is necessary to determine the presence or absence of extra-ocular or intra-ocular disease.

3. The attitude that "the game is not worth the candle" is held by some ophthalmologists. We feel certain there are some colleagues who view with a smile of amused tolerance what they regard as excessive concern for the refinements and niceties of eye testing. They point out that the enthusiast's most meticulous effort may be quickly nullified by the bent frame, or the round lenses turned to an axis not intended. They recite with glee the easy tolerance of some eyes "fitted?" with lenses unsuited either in spherical or cylindrical components. But they seem to forget that for one pair of eyes so tolerant there are dozens which would be tortured by such maladjustment. Much depends on who is the owner of the astigmatic off-axis eyes.

4. Some men practicing in smaller communities have stated that they feel themselves in direct competition with optometrists. To maintain standing with patients they think they are compelled to "speed up" the work of refraction, to adopt short cuts, to get the patients through in a day, in a word, to lower the work to optometric levels. Such practice seems sheer folly and its continuance constitutes a betrayal of professional integrity. By method and practice the ophthalmologist should secure the most accurate measurements, and it is a matter of no moment whether his result is obtained in one day or 10. If the ophthalmologist is going to fall to optometric levels, he is doing far more than optometric propaganda could ever do to perpetuate in the public mind the utter confusion which now prevails.

5. Much inexact refraction comes from eye clinics. Many clinics are undermanned, and the number of patients demanding refraction exceeds the number which can be tested accurately, so that frequently the policy of "roughing it out and letting it go at that" prevails. Fortunately this criticism does not hold for some clinics in which the technical equipment is of the best and one or more men, skilled in refraction, are paid for doing expert work. The beginner in ophthalmology should adhere strictly to the teachings and practices of the art and science of refraction as taught by our ophthalmologic

masters. Such procedure may not in the beginning bring a large clientele, but eventually it will secure the confidence of the public, or at least, that part of the public which is sufficiently discriminating. In the meantime, there will be the consciousness of having done his work with precision, upholding the highest ideals of professional practice.

The authors conclude with the following statement:

"The mechanical art of the optician reaches its highest expression in the United States. More beautiful designs are constantly being developed. Prescription opticians are skillful in adapting the frame to the face so that the combination is harmonious. It is surprising, therefore, to note how frequently the 'fitting' falls far short of an ideal. Rarely, indeed, do our patients who have been previously examined appear with frames which are not too wide or too narrow, the latter defect being almost universal in 'pince-nez.' The lenses are too far from the eyes; they are placed too high or too low; possibly the upper edge of the lens comes in contact with the eyebrows or the lower edge with the cheek or nose. Only rarely is there the slight forward tilt of the lens, the so-called pantoscopic position, which is necessary in reading glasses to insure that there is a minimum of obliquity in looking through the lens. Bifocal segments are too often improperly centered; they are often too large to permit easy side glances through the distance portions. The adoption of small (13 or 14 mm.) round or D-shaped segments with the lower edge terminating several millimeters above the lower edge of the frame is a great boon to many who literally have found the old style large segments occupying one quarter to one third of the total lens area, a serious 'stumbling block.'

"In this paper we have purposely omitted the consideration of the ocular muscles, as we desire to limit our discussion solely to the problems of refraction. We do not neglect a careful estimate of the heterophorias, the near point of convergence, convergence or divergence excess or insufficiency, and our refraction estimates are often modified by these findings. We have been especially impressed with the frequency of hyperphoria and thoroughly believe in its correction."

Factories and Workshops Annual, 1931

REPORT OF CHIEF INSPECTOR *of Factories and Workshops for the Year 1931* (Great Britain, June, 1932):—This excellent monograph gives the experience of Great Britain for the year 1931 and is a veritable encyclopedia of information regarding industrial hygiene and medical experience.

Under the heading of "dangerous trades," various experiences which will be useful to all industrial physicians are set forth. These will be summarized under separate headings.

Asbestos. The steps taken to eliminate asbestos dust in large manufacturing plants may be summarized as follows:

The dangers arising from the use of asbestos have been largely, if not altogether, overcome at the large works in the district devoted to the manufacture of asbestos-cement goods. Up to about a year ago one could not call conditions otherwise than unsatisfactory. The asbestos poured from bags into great edge-runner mills gave off dust, both in being poured and in grinding. At the batching bins, the workers, wearing mufflers over their faces, were covered with asbestos and it appeared hopeless to get adequate exhaust. At the pipe smoothing plant, where the pipe rotating in a lathe is sandpapered, there were more dust clouds. Owing to the various forms of pipes and other articles the firm tried many varieties of hoods to get adequate exhaust, mostly with but moderate success. Meanwhile, experiments with a wet process were being conducted and finally brought to an almost successful conclusion. At the present time the only dry work being done is the weighing out of the dry asbestos at the commencement of the process and this will be done in an enclosed machine shortly. After that the whole of the process is wet. The greatest trouble proved to be at the sandpapering of the pipes. Here it was found that ordinary wet sandpapering gave a dull and unpleasing finish. More experiments followed, and eventually a method was found of retaining a polished surface on the pipes although the sandpapering was still done wet. From being one of the dustiest works in the district, this is now one of the cleanest.

Chromium Plating. In certain instances the vats constructed by various firms failed to function efficiently in conjunction with exhaust ventilation. After some experimentation, however, this has been remedied.

There has been some difficulty with regard to the wearing of rubber gloves—the best method of overcoming this difficulty appears to be to use racks or jigs on which the articles are wired before putting into the bath; the jigs are then placed in the bath and subsequently taken out by a man who wears rubber gloves. It has also been found that gloves with a covering of crepe rubber over the palms and inside the fingers will prevent slipping.

Periodic medical examinations are being conducted regularly and the washing accommodations at the larger plants are generally of a high standard. Provision of paper toweling has been found to be an economical arrangement. Regulations have been issued dealing with chromium solution splashes into the mouth; splashes of solution into the eyes; and serious splashes on the hands.

Metal Grinding. The report mentions a decrease in the use of natural sandstones both in cutlery and other miscellaneous industries. One firm is already negotiating for the replacement of their sandstones by abrasive wheels. In many districts no sandstones are used.

Sandblasting apparatus for cleaning and smoothing castings, stampings, and forgings, continues to increase in use. Three classes of abrasives are used, metallic shot, sand and flint, but the latter two despite certain difficulties are gradually being replaced by shot and have been entirely eliminated in one large factory in which telephone apparatus is made. Shot has been substituted for sand in all metal blasting and the ebonite which cannot be treated successfully with shot is being treated with an enamel finish. In the meantime the conditions of the sandblasting rooms are being improved. New types of dust collectors and methods of extracting dust have been devised.

Pottery work. An attempt is being made to find a satisfactory substitute for flint for bedding purposes; although bone, aluminum, bone and plaster of Paris, and cellulose combined with a larger grade of flint, have all been tried, no satisfactory substitute has yet been found. In the processes of bedding and polishing, the workers come directly into contact with free silica, so that this is an important item. However, due to proper arrangement of exhaust ventilation, few cases of silicosis have occurred to persons working in these two processes where sufficient ventilation is provided.

Lighting. Based on measurements made in more than 200 factories in the iron founding, light engineering and textile industries, results show that few factories are provided with really satisfactory installations. The defect due to glare is very common and a large number of the readings fall below what is to be expected even as moderate standards, some

showing definitely bad conditions. More than half the readings in iron foundries where the nature of the surroundings would call for especially good lighting, fell below 1½ foot-candles, only 11% attaining the reasonably satisfactory standard of five foot-candles or more.

Ventilation. Progress is reported in the provision of exhaust ventilation in removing dust and fumes. Processes in the manufacturing of cleaning powders have received great attention with general improvement in both large and small plants. An effective device for the preventing the escape of dust when bags of scouring powder containing a high percentage of silica are emptied into enclosed mixer, has been reported. A new and simple method of cleaning dirty sacks has also been devised, as well as an effective system for the removal of fumes arising from kettles in a varnish factory.

The report of the Senior Medical Inspector of Factories, Dr. John C. Bridge, is also of great interest.

A general table is used showing reports of various occupational diseases with comparison of figures for the years from 1900 to 1930. This table gives data on lead poisoning, phosphorous poisoning, mercurial poisoning, arsenical poisoning, carbon bisulphide poisoning, aniline poisoning, toxic jaundice, anthrax, epitheliomatous ulceration and chrome ulceration.

The lowest figure for lead poisoning that has ever been recorded is contained in the report, 168 cases having been registered with 21 deaths, the average age at death being 51 years. Improved mechanical methods in manufacture, combined with better protection and the increasing interest and vigilance of manufacturers have been responsible for this.

The report shows a decrease in the number of cases of dermatitis, which are analyzed according to causative agent in occupations for the years 1927 to 1931 inclusive.

Deaths from fibrosis of the lungs amounted to 785, of which 319 were due to silicosis, as compared with 241 last year. These cases occurred principally in the various industries as follows: pottery, sandstone (including quarrying and stone-cutting), coal mining, grinding industry, gold mining, tin mining, refractories, and sandblasting, in the order named.

Nine deaths were reported from asbestosis or asbestosis with tuberculosis. Knowledge of 35 deaths from asbestosis or asbestosis with tuberculosis is also available.

Special tabulations were made of the number of deaths and the average age at death, the duration of employment, for silicosis, silicosis with tuberculosis, asbestosis, and asbestosis with tuberculosis, other tabulations being made in regard to the various industries in which these deaths occurred.

Under the heading of fumes and gases, data are given on carbon monoxide, carbon dioxide, hydrogen sulphide, gasoline, acetone, methyl chloride, phosphorus pentachloride, phosgene, nicotine, cellulose spraying, cadmium, and brass founders' ague.

To the industrial physician who is interested in keeping up with American and international experience, this report should prove invaluable.

Report of Governor's Committee

REPORT OF GOVERNOR'S COMMITTEE *to Review Medical Problems Under Workmen's Compensation Law, The Industrial Doctor* (April, 1932):—The report of the committee in New York State contains many items of interest to industrial physicians, but probably the preliminary report of the medical subcommittee is of greatest importance to them.

The questions which have been referred to the medical subcommittee are as follows:

1. Consideration of occupational diseases not in the statutes;
2. Propriety of the insurance company's doctors being present at the time of examination of claimants by state physicians;
3. "Lifting";
4. Propriety of insurance carriers operating clinics;
5. Propriety of having medical records in a case come from insurance company's physicians;
6. Matter of careless and improper care at insurance company clinics or clinics patronized by them;
7. Are patients discharged too soon or do they receive proper treatment?
8. Would free choice on the part of patients be advisable?
9. Definition of an emergency case;
10. Professional and clerical staff in the department;
11. Partial and total disability; and
12. Supreme court of review on medical questions.

The recommendations of the medical subcommittee corresponding to the above numbered headings, and set down in the same order, are:

1. The New York Workmen's Compensation Law should be promptly extended to cover all occupational diseases by the method recommended in the Department of Labor. (See text of full report.)

2. Because the individual whose case is being considered looks upon the insurance physician as a hostile witness—under salary from the insurance company and representing an interest opposed to that of the patient—it is believed for the best interest of everyone concerned that the committee should recommend that insurance physicians be excluded from examinations made by state physicians.

3. The committee defines "lifting" as a situation occurring when an individual handicapped while at work is compelled to change from one medical attendant, whether private physician, clinic or hospital, to another medical group or attendant; this action having been caused through an agent of an insurance carrier or by means of a threat or suggestion or offer of a pecuniary character. The committee officially recorded its disapproval of this practice and recommended that the place in the law relative to the practice of "lifting" be in Section 13 of the Workmen's Compensation Law—that the penalty for infringement be a forfeiture to the State of New York of a sum ranging from $50 to $150 enforceable in the case of insurers in the State Fund and self-insurers by the State Industrial Commissioner, and in the case of other carriers by the State Superintendent of Insurance. The committee further approved of the transferring of patients from one medical authority to another in all cases in which it could be exclusively shown that a change of medical service is essential for the purpose of maintaining proper medical care.

4. Evidence presented at public hearings before the committee indicates that cases have been "lifted" to clinics—treatment in some of them has been unsatisfactory—and men have been inconvenienced on account of inaccessibility of the clinic used. It is the feeling of the committee that except in special instances these activities are not essential for the successful operation of insurance carriers (except in localities where adequate facilities for medical care do not exist) and in proof of this is offered evidence that certain successful companies do not maintain such clinics.

5. It does not seem just that the plaintiff to an action should have to depend upon evidence supplied by the defend-

ant. If an injured man is treated in an insurance clinic, the sole medical records of the case are kept by the doctors employed by the carriers who give the treatment in these clinics. To call in experts to decide on a man's status does not rectify the condition, as such experts later must depend on the same records. The committee believes that so long as insurance companies maintain clinics the records must necessarily come from insurance company doctors. The committee further believes that there is no foundation for belief that there is wilful or intentional falsification of records, but that there would be less dissatisfaction if records came from a disinterested party, and that there is a certain degree of impropriety in the present situation.

6. As evidence of careless or improper care at insurance company clinics or clinics patronized by them, the committee has found a particular instance of the existence of improper quarters; lack of cleanliness; the use of dangerous and unprotected equipment; inadequate personnel; and unlicensed practice of medicine and physiotherapy. Such conditions call for immediate correction. The high standards of practice found in some of the clinics demonstrate that the abuses recited are not inherent in such systems, and warrant the belief that these practices could be eliminated by a proper system of supervision. It is recommended, therefore, that suitable legislation be devised restricting the treatment of injured employees to such physicians, nurses, physiotherapists, and others as are specially registered therefor by an appropriate official department; that each clinic or station be similarly registered, such registration to include the requirement for the attendance of a licensed physician at all times. Registration should be granted only after a suitable examination and inspection (including suitability and condition of quarters and equipment); provision should be made for periodic re-examinations and inspections upon receipt of any complaints. Control of these regulations should be maintained by the simple expedient of refusing to honor bills for medical service rendered by an unregistered physician or clinic and by prohibiting the payment of such bills by any carrier.

7. The committee realizes the importance of securing for the employee the benefit of the best judgment of an impartial physician, owing no allegiance to carrier, employer, medical service agency, or even employee, and free from any interest in the financial return for such service. Until this problem is solved, there can be no real cure for such abuses in medical service as:

(a) The premature discharge of injured employees from hospitals;

(b) The failure to provide proper specialists' services;

(c) The reference of employees to places excessively distant from their homes;

(d) Premature discharge of patients from treatment—evidence of this was obtained from a test conducted by the Industrial Council, showing 40% of cases examined were declared by impartial medical opinion to have been prematurely discharged; and

(e) The mistrust on the part of patients of the physicians attending them—a condition prejudicial to the patient's morale and his speed of recovery.

The committee further recommends that there be a committee appointed for the purpose of continuing the investigation of medical problems along the lines indicated, as well as for the purpose of receiving specific complaints or suggestions from interested parties relating to the treatment which injured workers are actually receiving at the present time.

8. Because physicians are not rated according to their individual capacities for this type of work and are not specially registered by a responsible state agency, it is the belief of the committee that free choice is not advisable and that the present system although fraught with certain evils offers a greater degree of protection to the injured man than free choice. However, the suggestion is made that some method should be devised by which members of the medical profession who desire to indulge in compensation practice should be designated or licensed according to their several qualifications and capacities. It is further suggested that this matter be referred to the State Board of Regents.

9. The following definition of an emergency case is presented: One which requires immediate medical attention and in which delay jeopardizes the welfare of the patient and mitigates against the optimum result of his care and treatment.

10. From personal observations it is evident that the number of physicians in the department should be increased to be fair to the injured man. This is because of the great number of duties, including examination of cases, testimony before referees, and clerical work, making it impossible that numerous cases can receive a degree of careful consideration which they demand. The same recommendations apply in the clerical staff.

11. Partial disability has come to mean the condition of an injured man who has so far recovered that he is able to do some form of light work which may not necessarily be connected with his regular occupation and oftentimes may not be remotely related to it. In consequence of this he is considered partially disabled and his compensation is reduced. The economic injustice of such regulations, to the injured man, can be illustrated by various cases available. Total disability should mean that a man is unable to return to the occupation in which he was formerly engaged at the time of injury and that he should be compensated until he can resume that work. If, in the meantime, he earns something with light work, that amount should be deducted and he be paid only the balance. The referees should be depended upon to check cheating and malingering under such regulations; it does not seem just that the carriers should have the determination of this question, such action being a usurpation of function never intended by the law.

12. It seems advisable to suggest the formation of a body of experts composed of medical men of high professional standing, these persons to be absolutely unbiased and not swayed in their opinions by any outside influence, pecuniary or otherwise. This is because many persons who have had experience believe that it would offer definite improvement to have medical matters of a high technical nature decided by professional men and not by laymen. The committee, therefore, has suggested the following principles for serious consideration:

(a) A panel of 75 men to be selected as a medical commission, to which medical questions could be submitted (to a specially selected committee of three or five) and both sides would be bound by the final decision of that committee.

(b) This body of experts would be used whenever desired by either party for determination on a purely medical question.

(c) It is important to have a panel of sufficient size to obviate any claim of chicanery in the panel. Either claimant or other party dissatisfied could demand examination and decision by a majority of three or five selected to make examination.

(d) Whether judges should be recompensed on a "case,"

"time," or "salary" basis is important and a method should be devised by which the expense should not be unduly increased.

It is to be borne in mind that these recommendations and regulations were devised in relation to industrial work principally in New York City, and somewhat throughout the state. Other states and cities should be very much interested in consideration of these principles, particularly in communities where a high state of industrialization has taken place.

Economics of Industrial Medicine

CAREY P. McCORD, M. D., *Medical Director, Industrial Health Conservancy Laboratories, Cincinnati, Ohio, in Journal of American Medical Association, April 9, 1932; Abs. from S.I.S.:*—The enactment of workmen's compensation acts by the various states in the decade between 1910 and 1920 forced the American manufacturer to enter on the practice of medicine. These laws not only saddled him with increased responsibility for industrial injuries, but in some states he was also made liable for occupational diseases as well.

The general trend of compensation legislation has always favored the worker, who was absolved from contributory negligence while the employer was penalized for proven negligence. "These state laws further vary as to the form of insurance funding. Some states created a state monopoly, procuring and administering the funds; others permitted carriage through private insurance companies; still others permitted a choice between the two; and again others might arrange for self-insurance, provided the individual factory could give adequate bond or other satisfaction to the state, guaranteeing adherence to the state's stipulations. All agreed in one respect—the manufacturer footed the bills.

"At the present time, rates in one state vary from $.03 per $100 of employee payroll for office workers to $26 for building wreckers. It follows, therefore, that a manufacturer having a monthly payroll of $83,000 (approximately 625 employees earning an average weekly wage of $30) and taxed at the rate of $2 per $100 of payroll (which may be slightly above the average) pays about $20,000 in the course of the year for his compensation insurance. This is not all; in some states a bad experience in terms of accident severity or frequency may lead to penalties without limit, so that the basic payment of $20,000 yearly may be raised to double that amount or more."

The employer soon learned that injuries were costly; that their prevention cost considerably less; but most important of all, that both accident frequency and severity might be appreciably reduced. "Actual experience proved that it was not unusual for the frequency of accidents to drop from 75 to 85% as a result of sustained and proper safety activities. The elimination of two-thirds of the severe accidents in industry has yielded enormous savings in insurance premiums and in life and limb."

The manufacturer also made another important economic discovery. "He found that the indiscriminate handling of real or alleged industrial injuries and occupational diseases, by physicians chosen at random by himself or the individual patient, eventuated in a total cost per case of nearly double that required for all services carried out under a unified service, by a thoroughly competent physician, chosen with full consideration of the patient's interests. . . . The manufacturer is willing to recognize that physicians, like all other human beings, are not standardized as to ability or integrity, and applies this belief in his honest endeavor to serve his stockholders and his valued employees. While the laws of most states provide the free choice of physicians on the part of the person injured in industry, the manufacturer is loath to delegate the conduct of this important item of his affairs on a helter-skelter basis to any and every person in the community possessing a license to practice medicine."

The following pertinent facts are cited by the manufacturer to warrant his selection of the industrial physician:

"A. Accidents in his industry may occur at any hour of the work day, and for the greater portion of the day the practitioner is away from his office on calls at homes or at hospitals.

"B. The time lost in going to and from the offices of various physicians, and the time consumed in waiting turns for treatment, involves an intolerable money loss due to idle machinery and lost time.

"C. The periods of total disability allowed by many physicians are often unwarranted, as judged by other physicians. These are expensive and create discord if protested.

"D. Dressings applied by many physicians for patients returned to duty frequently are dangerous and lead to further accidents.

"E. Infection rates are high in proportion to the amount of uncontrolled medical care.

"F. Unwarranted diagnoses, involving the plant operations as a cause, are often made in connection with injuries or disease states arising apart from work. One manufacturer cites a compensation claim for urticaria, which was diagnosed as 'brass poisoning' when the worker was engaged in some such occupation as tailoring.

"G. Records required by law are assembled with the greatest difficulty when the entire group of physicians of the district participate in their compilation.

"H. The general practitioner often feels it to be his sole duty to advocate the cause of the patient in disputed matters, instead of acting as the neutral umpire, serving the two interests equally and without prejudice.

"I. The general practitioner often refuses information necessary in rearranging the disabled employee's work. Haughtily, the physician in charge may state that the patient's condition is a matter between himself and his patient.

"J. The majority of industrial injuries in any plant are trivial, not justifying a search for the family physician, but calling for minor emergency care as a preventive against infection. This type of work is more satisfactorily done on the factory premises.

"K. Physical examinations may be required by law and are desirable in any event. These are best made by a physician not of the applicant's choosing. Physical examinations are of most worth when procedures are standardized.

"L. Many medical problems in every plant do not concern themselves with persons but with conditions, such as occupational disease hazards, ventilation, seating and noises.

"M. Some states require by law the maintenance of a dispensary and the rendering of medical services on the plant's premises."

There is a real economic need in industry for the services of the physician working on the plant's premises and intimately in touch with the plant's operations and work force. "In the meeting of this need, both the industrialist and the physician chosen have often made glaring and inexcusable blunders, costly to the cause of industrial medicine at its best and unfair to the workers, to the medical profession, and not infrequently to the interests of the manufacturer."

"The fundamental evils of industrial medicine, as practiced, center about the lack of qualifications of the physician

in charge. The responsibility rests partly with the manufacturer in his choice of a physician, partly with the medical schools and partly on the absence of determining bodies governing fields of special practice. Over and over young physicians, on finishing their interneship, come to me with this statement: 'I have just finished my year in the hospital and probably will have a hard time making my way for a while, unless I can get a factory. Will you help me?' This seems to be the medical profession's idea of industrial medicine. This young and possibly well-trained physician is probably far better qualified to undertake brain surgery than a commendable form of industrial medicine. He is forbidden the former but condoned in essaying the latter."

The special qualifications which place the industrial physician apart from the general practitioner are not so much superiority in medical matters as a definite understanding of other phases of industrial practice which are unrelated to medicine.

Watkins has said: " 'It took the medical profession quite a while to realize that the possession of a sound medical education did not, *per se*, qualify a man adequately to carry on the duties of a health officer. The profession has likewise been somewhat slow to recognize that the acquisition of sound surgical technic or skilled diagnostic ability does not qualify a man to carry on the duties of an industrial physician.'

"The chairman of the Section on Preventive and Industrial Medicine and Public Health of the American Medical Association, in Philadelphia, last year said:

" 'Although there are able and experienced industrial physicians competent to deal with any situation which may confront them, one still finds all too frequently physicians who have no real appreciation of the nature and effect of working conditions and only an imperfect conception of pathology, symptoms, treatment or prevention of specific occupational diseases.'

"Some physicians in industry, either at the instigation of their employers or because of their own misinterpretation of their function, wage warfare on the workers with respect to medical matters, seeking to defeat every possible claim through technicalities, antagonizing the worker who insists on his family physician in the event of industrial disability, procuring the discharge of workers whose medical record is lengthy, undermining the relations between the worker and his family physician—in short, a near-sighted all-consideration for the employer and none for any one else.

"A . . . class of questionable practices on the part of the so-called industrial physicians may be found in the use of an industrial connection to build up a private practice. The greater number of physicians in industry are there on a part time basis. During other hours, private work is carried out like that of other physicians in the neighborhood. It is a very common practice to divert all possible patients, with conditions unrelated to work as the cause, to the private office, using whatever pressure may be necessary to accomplish this."

"A further objectionable practice, but far from exhausting the possibilities of improper industrial medicine, is the misuse of the medical department for direct profits to the manufacturer."

"Medical colleges, with few exceptions, are so influenced by the hostility of the medical profession toward industrial medicine as to minimize all training in the preparation of students for this work, or in the idea that such work is a specialty calling for selective training after graduation."

"While the medical profession has been fiddling over the faults of industrial medicine, the plums of opportunity have fallen into other laps. Instead of organized medicine creating, guiding and controlling the lines along which developments should have taken place, we find most of the work, good or bad, in this field (except for emergency relief and surgery) carried out by governmental departments, insurance companies, statisticians, sanitarians, hygienists, psychologists, pseudopsychiatrists, chemists, safety engineers, optometrists, food faddists, efficiency experts, engineers and nurses. Some considerable pain should be produced by the statement that the doctor in industry sometimes functions under the nurse as the head of the department, and often under the safety engineer. Except for those matters that require legal medical license, much that is good in industrial medicine threatens to pass out of the rightful hands of the medical profession."

"If . . . the present upset in industry may be regarded as temporary, industrial medicine is now needed more than ever before. Heretofore this form of medical endeavor has been most successfully applied in organizations having more than 2,000 employees. Under such circumstances the *per capita* cost is sufficiently low to warrant an adequate staff and extensive equipment. Unfortunately, of the total number of plants in this country, approximately 99% employ less than 500 workers; and 75.9% of all workers may be found in plants utilizing less than 1,000 employees. It is now being discovered by an ever increasing number of manufacturers that in the range between 250 and 1,000 employees, and particularly between 500 and 1,000 employees, it is economically sound to maintain medical departments utilizing full-time physicians.

"In addition, the increase in need for medical guidance grows out of the marked extension in the use of new raw materials."

"The very foundation of this form of medicine is the day-by-day services to employees, in order that they may remain on the job as wage-earners and producers. Two major divisions of endeavor exist. The first is the protection of the worker against the harm lurking in work materials, processes, or other workers; the second is the elimination of inefficiency attributable to sickness or other abnormal physical or mental states in workers. It may be pointed out at this point that the industrial physician must rigidly establish himself in an impartial position midway between the employer and the employed, and that his prime duties include:

"(a) The care or supervision of those pathologic states for which the employer is legally responsible.

"(b) The physical examination of applicants for work and, at intervals, those already at work.

"(c) The maintenance of satisfactory sanitary and hygienic work conditions.

"(d) The protection of workers against the spread of communicable diseases in the factory.

"(e) The care and supervision of minor abnormal physical conditions unrelated to work as a cause, to the end that the affected worker may be kept at his duties.

"(f) Cooperation in the placement of workers at the tasks for which they are physically and mentally suited.

"(g) The education of the work force in matters of health, sanitation, hygiene and the like.

"(h) The giving of advice to workers regarding health matters unrelated to work, the treatment for which is properly within the domain of the family physician or the specialist, and the establishment of relations with the family physician for the purpose of handling these private matters to the best interests of all concerned."

"Defective vision may truly be the worker's private misfor-

tune, but it becomes a misfortune to the employer if this poor eyesight leads to the daily spoilage of 5% of his raw materials, or if this poor vision leads to injury to himself or to other workers. Some 20% of all injuries occurring in industry are the result of failure to see the danger promptly or adequately; that is, poor vision or poor lighting. In any such situation as this, three avenues of control offer themselves to the employer:

"1. He may discharge the employee as a menace to others in the plant, and a source of too much wastage. Without argument, this is the poorest possible way to meet the difficulty.

"2. He may demand that the workman seek refraction and the fitting of glasses prior to any further work. Part of the time this is a good solution. The workman goes somewhere and an arrangement is worked out whereby a correction is provided. At least half the time this plan fails, either because the worker has no family physician to advise him or because he falls into the hands of the ever-present incompetent provider of glasses, or because he is unable to pay for glasses.

"3. He may direct the plant physician to investigate the workman's inefficiency and remedy the cause if found. In turn the physician may refract or procure a refraction and see that proper glasses are obtained. If the workman is truly unable to expend the full amount necessary, the industrial physician will assume responsibility for the purchase and make fair deductions from the worker's pay envelope over several weeks' time.

"Endless variations in this type of problem should lead to the passing of from 3 to 6% of the plant's personnel through the medical department's hands on an average day. The values that reside in this type of work are about equally divided between the employer and the employee. It is ordinarily true that, before the employer may profit, the workman must have earlier profited. Furthermore, good industrial medicine works to the advantage of the qualified neighborhood physicians."

"Factory physical examination and routine consultation with the factory physician will unfailingly disclose large numbers of conditions not properly falling within the activities of the plant physician. Without enumerating the great variety of these states, I will say that the work of competent physicians in any industrial community should be augmented rather than restricted by the work of the industrial physician. Instead of the industrial physician being regarded as a menace, he should be accepted and cooperated with as a proper source of legitimate cases, the adequate treatment of which will well serve the interests of the worker, his particular industry or the public good, to say nothing of enhancing the economic status of the physician."

"Despite immediate conditions in industry, there is no substantial reason to believe that this country will not regain its industrial prosperity. Forty-eight million persons will again become gainfully employed. Adequate industrial medicine and sanitation are now applied to not more than 4% of this country's industries. No less than 5,000 factories and mercantile establishments in the United States are of such size as to warrant the full-time services of one or more well-trained and well-paid physicians. . . . Fifty-four million dollars, the approximate sum annually paid as a salary for the potential group, is but a small fraction of the monetary savings that their highly qualified services may effect in industry. If it is agreed that a prime function of the medical profession is to apply to the public those health- and life-conserving measures proved by scientific endeavor to be efficacious, it must be recognized that the organization and requirements of industry afford one of the few sustained opportunities for the legitimate exegesis of medicine to adult groups."

Relationship of Lead Poisoning to Industry

JOSEPH C. AUB, *Bulletin, United States Bureau of Labor Statistics* (January, 1932): "In order to understand the problems of lead poisoning as they occur in industry, it is essential to understand somewhat the way that lead poisoning affects the organism. . . . Lead can get into the organism in essentially three ways: First of all, it can be swallowed through the intestinal tract and so absorbed. Secondly, it can be taken in by the lungs in the form of dust and fumes. Finally it can be absorbed very readily from the nose and from any of the mucous membranes of the body. . . . In the work that we did a few years ago it appeared obvious that lead which was present in the lungs could cause poisoning much more easily than lead which was taken in through the intestinal tract. The reason for this is now clear. Much of the lead in the gastro-intestinal tract is never absorbed. It stays in the tract and does no harm there. Secondly, part of that which is absorbed is taken up by the liver and part of this is again put back into the intestinal canal and excreted. The rest of the body, therefore, is partly protected from lead which gets into the gastro-intestinal tract. However, the lead which gets into the lungs is absorbed directly into the general circulation of blood. That lead is, therefore, available to do whatever harm lead does to the organism.

"As a result, lead which is taken into the nose or throat or into the lungs will cause as much poisoning as about 10 times that amount when swallowed. That is a relatively new point of view." Much stress has been placed on the cleanliness of the men before they eat and the danger of ingesting lead when chewing tobacco, but these sources of lead are less important in industry than exposure to dust and fumes.

"If you can avoid dust and fumes you can largely eliminate lead poisoning. Painters get lead poisoning mostly from sandpapering dry paint, and not from mixing paint. If they would use the new kind of oiled sandpaper which is available, with which it is possible to wet down the paint with water, lead poisoning would largely disappear among painters, except among the spray painters. . . .

"When lead finally gets into the organism, it is important to appreciate what happens to it. As long as lead is circulating in the blood stream it is dangerous, and it is important to be able to control that lead stream. When lead gets into the body it usually goes primarily to two places. First of all it is deposited in the liver and kidneys and, immediately after lead is absorbed a large percentage is found here. After lead has been absorbed and exposure to it has ceased practically all of it is found stored in the bones. The presence of lead in the soft tissues of the body, like the liver, is of paramount importance, because that means that lead is circulating, and in medico-legal proceedings, therefore, possibly a contributory cause of death. As long as lead stays in the bones it apparently causes no damage, but if the individual gets sick, or if he gets pneumonia, or has a prolonged alcoholic debauch, or anything else that disturbs the inorganic salt metabolism of the body, then lead may be liberated from the bones. This is because lead in the body responds to the same stimuli that influence calcium. When calcium is liberated from bones, then stored lead is also liberated. When this lead is too rapidly freed, then a lead colic, or some other manifestations of lead poisoning may be precipitated.

"With that knowledge it is possible to control the circulation of lead in the body above a certain minimum because it is simply necessary to control the circulation of calcium in the body. It is upon that theory that our new treatment of lead poisoning is based. In a patient with an acute lead colic it is necessary to store in the bones the excessive lead which is circulating, and what one does is to give as much calcium as possible to the body in order to throw the stream of calcium back into the bones. When you want to pull lead out of the body a low calcium diet is prescribed plus acid salts further to stimulate the body needs for calcium.

"This is important, because even though lead is in all of the bones of the body and it is manifestly impossible to liberate all of it, the lead which is most readily available can be liberated. There are small parts in the bones which readily give up their calcium when there is a bodily need for it. When acids are given this very readily available calcium, and the lead that is stored with it, are liberated.

"From the medico-legal point of view one of the great problems is diagnosis of lead poisoning. There are more diagnosis of lead poisoning made than are justifiable, because no distinction is made by most physicians between lead absorption and lead intoxication two very different things. Most of us have lead absorption, for much of the dust on the city streets has lead in it. Therefore, many people are secreting lead in their urine. Lead absorption does not mean that an individual is suffering from lead poisoning. Many people work in lead industries for a long time and absorb much lead but never show poisoning from the metal."

"In industry, one case of poisoning is very apt to precipitate the appearance of other similar cases. The true examples of intoxication must then be differential from the examples of suggestion or of malingering. An invaluable aid in such a situation is some objective sign such as the stippling of the blood with secondary anemia. . . . Added information is also obtained, of course, from the typical clinical picture. The picture of lead poisoning is usually clear. The first evidence consists of general weakness, with loss of appetite and severe constipation. Then lead colic may develop a very severe abdominal pain which moves from place to place. It is practically always associated with constipation.

"More severe manifestations are the paralyses produced by lead. These are now relatively rare and it is very important to prevent the condition. Paralyses are nearly always preceded by a period in which muscles are weak and in which fatigue soon appears. Thus, a painter may complain of an inability to hold the hand extended for any length of time. This is a danger signal, which should result in prompt removal from lead exposure. Such a condition then promptly gets well, but if true paralysis develops recovery is very slow.

"Lead palsy consists of a paralysis of extenosor muscles, whereas the flexor muscles are normal. The most characteristic paralysis is an inability to extend the fingers or wrist. Patients can easily hold objects such as a pipe and they can do other things, but it is accomplished with the hand well flexed on the wrist. . . . The most fatigued muscles are the ones involved. There is one other manifestation of lead poisoning which is now only very rarely seen—encephalopathy. It comes on fairly suddenly with convulsions, delirium, dementia and in a large percentage of cases causes death. Lead colic and lead palsies cause incapacity, but lead encephalopathy causes death. It is difficult to tell how long the duration of incapacity should be in these different forms of the disease. This depends upon the severity of the conditions and the way they are treated. A colic if properly treated should stop within 24 to 48 hours, and in my way of thinking the incapacity from a simple, not too severe lead colic ought to be about six weeks. The early manifestations of wrist weakness mean an incapacity of at least six weeks, but an established paralysis means a complete incapacity of at least six months. Lead encephalitis has a more indefinite period of incapacity. As I have already said, about 50 to 75% of those cases die. In the others the recovery is often very slow and there sometimes remains a permanent mental change. By incapacity I mean the period in which symptoms and signs of injury from lead can be found. Lead will still be present in the bones but without evidence of damage to body tissues.

"Another question which has been brought to my attention has to do with the end results of lead poisoning. I recently inspected a factory in which there had arisen a very interesting problem, from the legal point of view. There was undoubtedly a large amount of lead absorption, and there was a good deal of lead poisoning in the plant which certainly deserved compensation. The lawyers, however, were trying to show permanent disability in these workers, due to arteriosclerosis and nephritis, which they said was due to lead. It is true that arteriosclerosis and nephritis have been said to be produced by lead poisoning, but the evidence for arteriosclerosis is very slight. Nearly all of us have some arteriosclerosis after we reach 50 years of age. It is obviously ridiculous permanently to compensate an individual who had been exposed to lead for a few months because he also had an associated mild arteriosclerosis. I do not believe there is any good evidence that lead produces arteriosclerosis—certainly most arteriosclerosis is produced by other causes as yet unknown. The fact that an individual who has been exposed to lead has arteriosclerosis certainly is no indication that lead produced that hardening of the arteries.

"There is another problem, not often spoken of, which is of interest from the medico-legal point of view as well as from the medical point of view, and that is the neuroses which may be prolonged in patients who have had lead poisoning. It is extremely difficult to know whether these neurosis are due to lead poisoning or whether they are prolonged by the weekly compensation which the patients receive. It is true that children ill with lead poisoning may be irritable and nervous, too. This suggests that the poisoning may produce the neurosis. In my experience, however, these neuroses arise in people who have not been adequately treated or in persons suffering from severe lead poisoning. I have not seen them in patients who have received thorough, early treatment. They are also accentuated, just as are traumatic neuroses, by the weekly evidence of their compensation check. As long as they receive evidence each week that they are still sick they will remain sick. The best way to prevent these neurosis, in my experience, is thoroughly to eliminate lead from the body early in the disease. When the patient feels well, get him a job quickly, and if he deserves further compensation continue to give it to him even though he is at work. After a neurosis has developed, the best treatment is to settle the case with a lump sum of money, and get the patient back at some work. I am thinking of the patient's happiness, for it is no kindness to prolong a neurosis. The patients are far happier at work and they tend to lose their neurosis. Lack of work and weekly compensation merely prolong their worry and help make them chronic invalids. Lead poisoning, itself, I am sure does not produce this prolonged condition, except possibly in the rare cases of lead encephalopathy. The condition is largely dependent upon the methods of treatment and of compensation."